Santa Clara Valley
Water District

FOR SCVWD STAFF USE ONLY

COYOTE CREEK

MONTAGUE EXPRESSWAY TO INTERSTATE 880

Project No. 26174043

PLANNING STUDY REPORT

Prepared by:

Watershed Capital Division

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CHAPTER 1. INTRODUCTION

The Coyote Creek Flood Protection Project Montague Expressway to I-880 (Project) is located in the central portion of the Coyote Watershed. The project reach extends approximately 1.2 miles between Montague Expressway and Interstate 880, all within the City of San Jose. A map delineating the project limits and 1 percent floodplain is included as Figure 1-1. The primary objective of the project is to improve the creek's conveyance to protect homes, schools, businesses, and highways from a one-percent flood event. Additionally, the project will evaluate opportunities to improve fisheries, stream habitat values, and public access.

This Planning Study Report (PSR) of the Project has been prepared to describe a staff-recommended alternative and its development process in sufficient detail so the Board of Directors can provide further direction to staff**.**

The PSR also describes existing site conditions, identifies problems, defines opportunities and constrains, and summarizes the outreach activities to date.

1.1 BACKGROUND AND ORIGIN OF STUDY

Historically, flooding has occurred many times within the Coyote Watershed. The worst flooding, since Anderson Reservoir was constructed in 1957, occurred at upstream of the project reach in January 1997. That winter Coyote Creek overtopped its banks at several locations between Highway 101 and Interstate 280 and several homes and businesses were inundated by more than six feet of water. Highway 101 near Watson Park and several other major streets had to be closed due to flooding. The neighborhood near William Street also suffered severe damages to approximately 6 homes, a number of which had to be evacuated.

In November 2000, the voters of Santa Clara County approved funding for the Santa Clara Valley Water District's (District) Clean, Safe Creeks & Natural Flood Protection Program (Measure B), which includes planning, design, and partial construction of the Mid-Coyote Creek Flood Protection Project. The funding for this project will be provided exclusively from the Measure B.

In the Measure B ballot, the Mid-Coyote project limit was defined from Montague Expressway to Interstate 280, approximately 6.1 miles. The planning study for this area started in September of 2002. Comprehensive background information was collected, including topographic surveys, environmental data collections, and a historical ecological study. A problem definition report was prepared which summarizes the data collection efforts and identified obstacles for consideration during project planning (SCVWD, 2006).

A wide range of conceptual alternatives were developed to meet the project's stated objectives (SCVWD, 2010). Each alternative included a solution to the primary flooding objective while incorporating project elements to meet water quality, habitat, and maintenance objectives. The potential solutions included: channel widening, channel invert profile re-grading, floodwalls, a bypass culvert, offstream detention basins, and modifications to Anderson Reservoir operation and outlet structure. Public meetings, open houses, neighborhood community meetings, and field tours were held to solicit inputs from residents who live adjacent to the project area for the conceptual and feasible alternatives. Project presentations were also given to the regulatory agencies and City of San Jose during the project development.

A capital cost estimate was performed on each of the conceptual alternatives under consideration during this phase of the planning study and it revealed that all of the conceptual alternatives exceeded $500 million. In order to meet the original Measure B commitment of “partial construction” the project team began working on restructuring the project plan. The project team sought direction from the Deputy Operating Officer (DOO) of the Watershed Capital Division and the Project Owner of the Coyote Watershed. The result of that effort changed the course of the original planning study and focused efforts on the reaches that could be feasibly constructed.

The project team subsequently focused the planning study on reach from Montague Expressway to Berryessa Road and began evaluating feasible alternatives based on the work previously preformed. Six feasible alternatives were evaluated and potential solutions included floodwalls, levees, channel widening, and reprofiling the channel invert (SCVWD, 2011).

A cost estimate for feasible alternatives was developed and the results of the analysis indicated that the available Measure B funds could only fund construction from Montague Expressway to Interstate-880. Due to the uncertainty of the future funding, this PSR focuses on the reaches of creek which could be constructed within the Measure B funding limit. For the remainder of the reaches in the original planning study, from I-880 to I-280, a separate planning study report will have to be prepared in the future when funding becomes available.

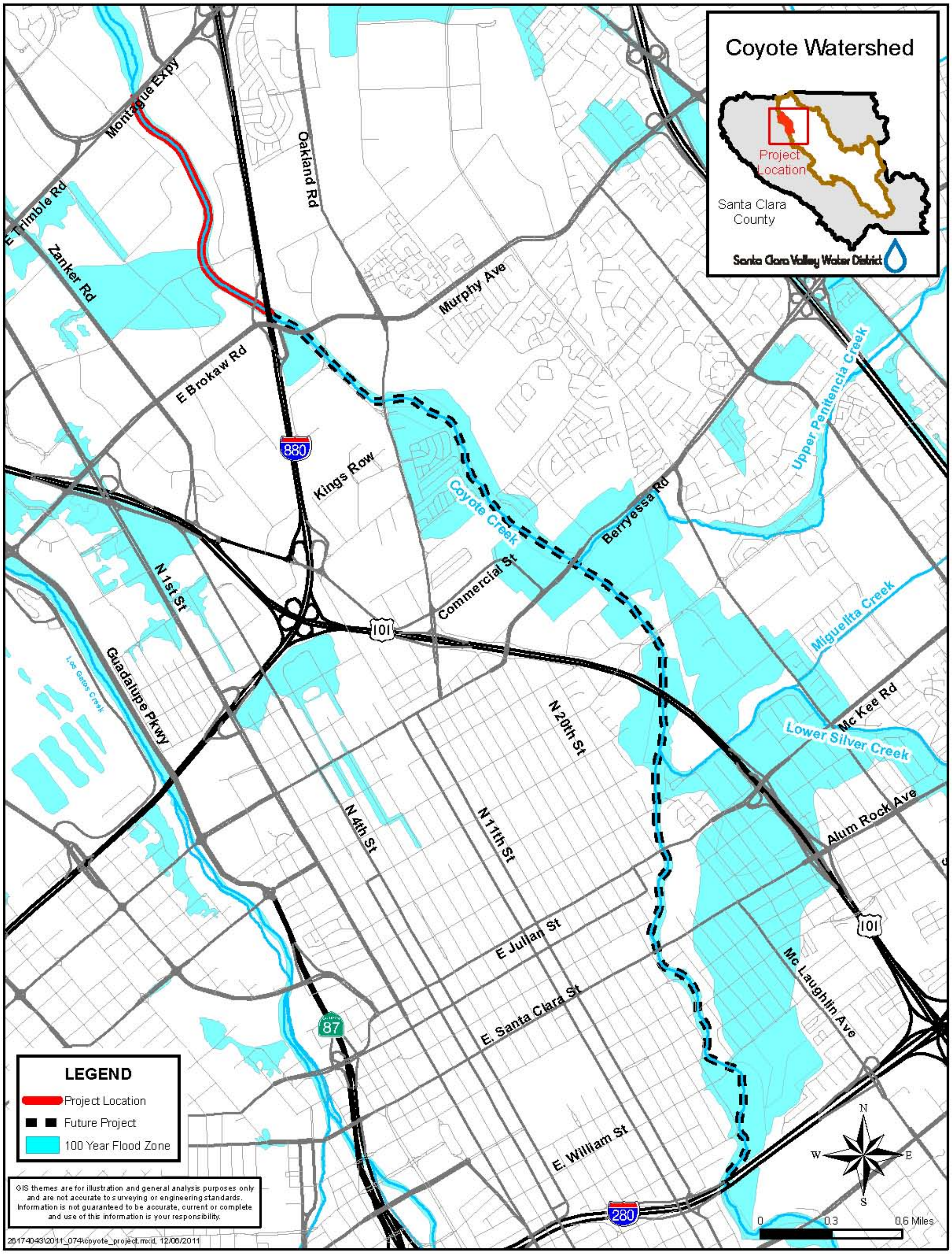

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Figure 1-1: Coyote Creek Montague Expressway to I-880 Project Reach

1.2 RELEVANT BOARD GOVERNANCE POLICIES

It is the goal of the District to provide a healthy, safe and enhanced quality of living in Santa Clara County through watershed stewardship and comprehensive management of water resources in a practical, cost-effective and environmentally-sensitive manner. The relevant Board Ends Policies are:

3.1.1. Balance environmental quality and protection from flooding.

3.1.2. Preserve flood conveyance capacity.

3.2.1. Reduce flood risks in flood prone areas.

3.2.2. Avoid the creation of expanded flood prone areas

4.1.2. Protect and improve watersheds, streams, and natural resources.

4.1.1. Balance water supply, flood protection and environmental stewardship functions.

4.1.2. Protect and improve watersheds, streams, and natural resources.

4.1.3. Promote the protection of aquatic ecosystem functions.

4.2.1. Preserve or improve surface and ground water quality for beneficial uses.

4.2.2. Promote the protection of water quality and stream stewardship.

4.3.1. Support additional trails, parks, and open space along creeks and in the watersheds when reasonable and appropriate.”

1.3 PROJECT OBJECTIVES

The Project objectives are to:

1. Provide flood protection from Coyote Creek’s one-percent flood event within the project limits wherever feasible, the use of non-structural and/or minimal hardscape features will be included for creek improvements.

2. Improve instream complexity.

3. Improve water quality within the project limits.

4. Support additional trails and public recreation.

5. Minimize the need for future operations and maintenance activities.

6. Obtain community support for the project.

The project team incorporated Board-approved Natural Flood Protection (NFP) objectives throughout the project’s development. Table 1-1 lists nine objectives outlined in the NFP guidance document and also scores a relative importance weight (1 to 10, with 10 as the highest) to each of the NFP objectives. These scores were developed by the project team in coordination with the Coyote Watershed Owner and have served to help direct the project’s planning process.

TABLE 1-1
Mid-Coyote Creek Project NFP Objectives

No.	NFP Objective	Relative Weight
1	**Flood Protection:** Focuses on providing protection to lives and property against the potential damages caused by large floods.	10
2	**Ecology:** Examines the potential to protect, enhance, or restore the natural resource benefits of streams and the watershed in ecological terms.	10
3	**Geomorphology/Stable Channel:** Addresses the ability to effectively manage the water and sediment from the watershed under both extremely high flows and routine low flows.	8
4	**Maintenance:** Focuses on minimizing the long-term obligation of operating and maintaining capital projects once they are constructed.	10
5	**Watershed Context:** Assesses how appropriate a project is to its location within the watershed and the physical, ecological, and social contexts.	9
6	**Water Quality and Quantity:** Addresses water-supply related goals, including quality and quantity of surface and groundwater associated with streams.	6
7	**Local Partner Agencies:** Measures how effectively a potential project meets goals of both the District and the partner communities affected by the project.	10
8	**Community Benefits:** Addresses the full range of community benefits beyond flood protection that might be integrated into a creek project.	10
9	**Life-Cycle Costs:** Examines project costs as a long-term investment rather than a one-time cost.	7

CHAPTER 2. STUDY BACKGROUND

2.1 COYOTE WATERSHED DESCRIPTION

The Coyote Watershed is the largest watershed in the Santa Clara Basin, encompassing an area of over 320 square miles. The entire city of Milpitas and portions of San Jose and Morgan Hill lie within its boundaries, as shown in Figure 2-1, with the remaining area comprising unincorporated lands within Santa Clara County. Of this unincorporated area, 21% (43,008 acres) is located within the City of San Jose Urban Service Area, 6% (12,288 acres) in the City of Milpitas Urban Service Area, and the rest (73 percent) is located in unincorporated areas of Santa Clara County (SCVWD, 2003a).

Land use within the Coyote Watershed has been significantly modified since the arrival and settlement of Spanish explorers in 1769. The shape of Coyote Creek has changed dramatically over the last two hundred years due to the land use change (Grossinger, et al, 2006). Coyote Creek and its physical and ecological features have played a significant role in the history of the City of San Jose and the Santa Clara Valley.

The Coyote Watershed is now approaching full buildout in the downstream areas of the watershed and there is minimal open space remaining within the urban service areas of San Jose and Milpitas. Areas where new development is proposed include the Evergreen Specific Plan area, Edenvale, and Coyote Valley, as well as one golf course adjacent to Coyote Creek. Most other development in the watershed is being accommodated through urban infill activities.

The bulk of the existing open space within the urban service area of the Coyote Watershed is concentrated within four areas: Coyote Valley, Western Milpitas, Evergreen and Edenvale. These open space areas correlate with major proposed development regions where development is already well underway. Large-scale development of the type occurring in these areas would not be able to occur in other areas of the Coyote Watershed without modifying the definition of the existing greenline/urban growth boundary, a strategy adopted by the City of San Jose and the County of Santa Clara to define the ultimate perimeter of urbanization in San Jose.

The northern and western portions of the Coyote Watershed comprise the valley floor area. This area slopes from south to north and east to west, draining to San Francisco Bay via Coyote Creek, which is the primary creek draining the watershed. Coyote Creek traverses the western edge of the watershed, and 29 major tributaries drain into Coyote Creek, including Upper Penitencia Creek, Berryessa Creek, Lower Silver Creek, and Fisher Creek.

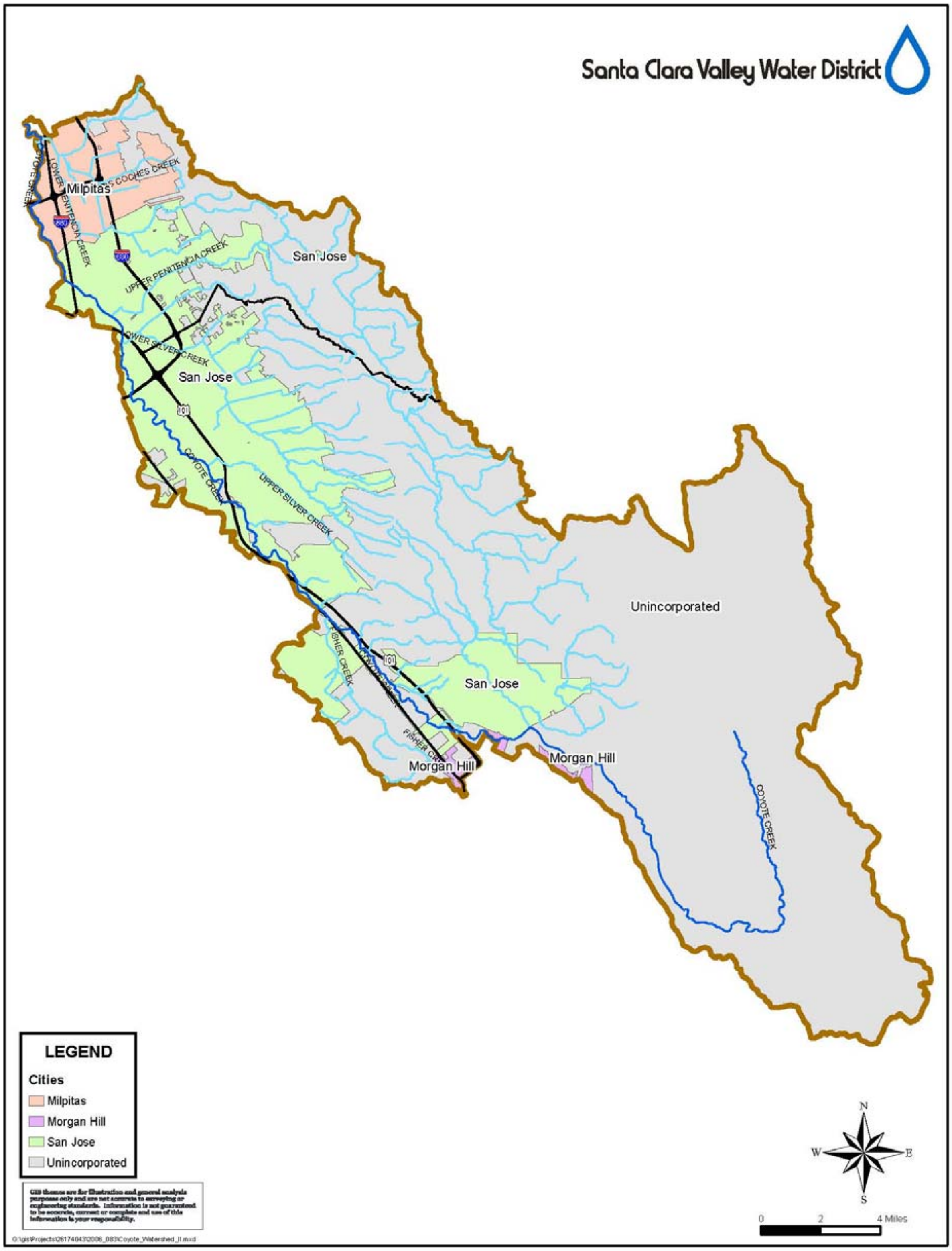

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Figure 2-1: Coyote Watershed Map

The major roads and arterials within the Coyote Watershed are Highways 101, 237, 85 and 130, and Interstates 680, 880 and 280. These roads crisscross the urban areas of the Coyote Watershed, but do not cross the Diablo Mountain Range on the eastern watershed border. Only minor roads leading to Alum Rock or Ed Levin Park lead to these upland areas.

Urbanized areas extend over the valley floor to an elevation of 600 to 800 feet. Above this level, moderately sloped areas are mostly rangeland, and steep-sloped areas are typically forested. Within the urbanized area, small patches of natural area and park dot an otherwise continuous swath of residential, industrial and commercial development.

The Cities of San Jose and Milpitas have typically urban characteristics within the valley floor, surrounded by undeveloped land in the upland areas. Upland land use consists primarily of rangelands and open space. The upland areas are located outside of the city’s Urban Service Area. These boundaries are intended to limit the extent of urban sprawl and the impact of new development on existing city services while preserving natural resources. Figure 2-2 summarizes the existing land uses within the Coyote Watershed by zoning designation.

Existing land uses along Coyote Creek vary considerably. Between the Montague Expressway bridge and the Highway 101 bridge, land use along the creek consists mostly of office parks and light industrial businesses. Upstream from the Highway 101 bridge and continuing to the Interstate 280 bridge, the creek is bounded on both banks by residential homes. Land use upstream from Interstate 280 and downstream from the Anderson Reservoir includes residential homes, multiple parks, a golf course, significant open space areas, trails immediately adjacent to the creek.

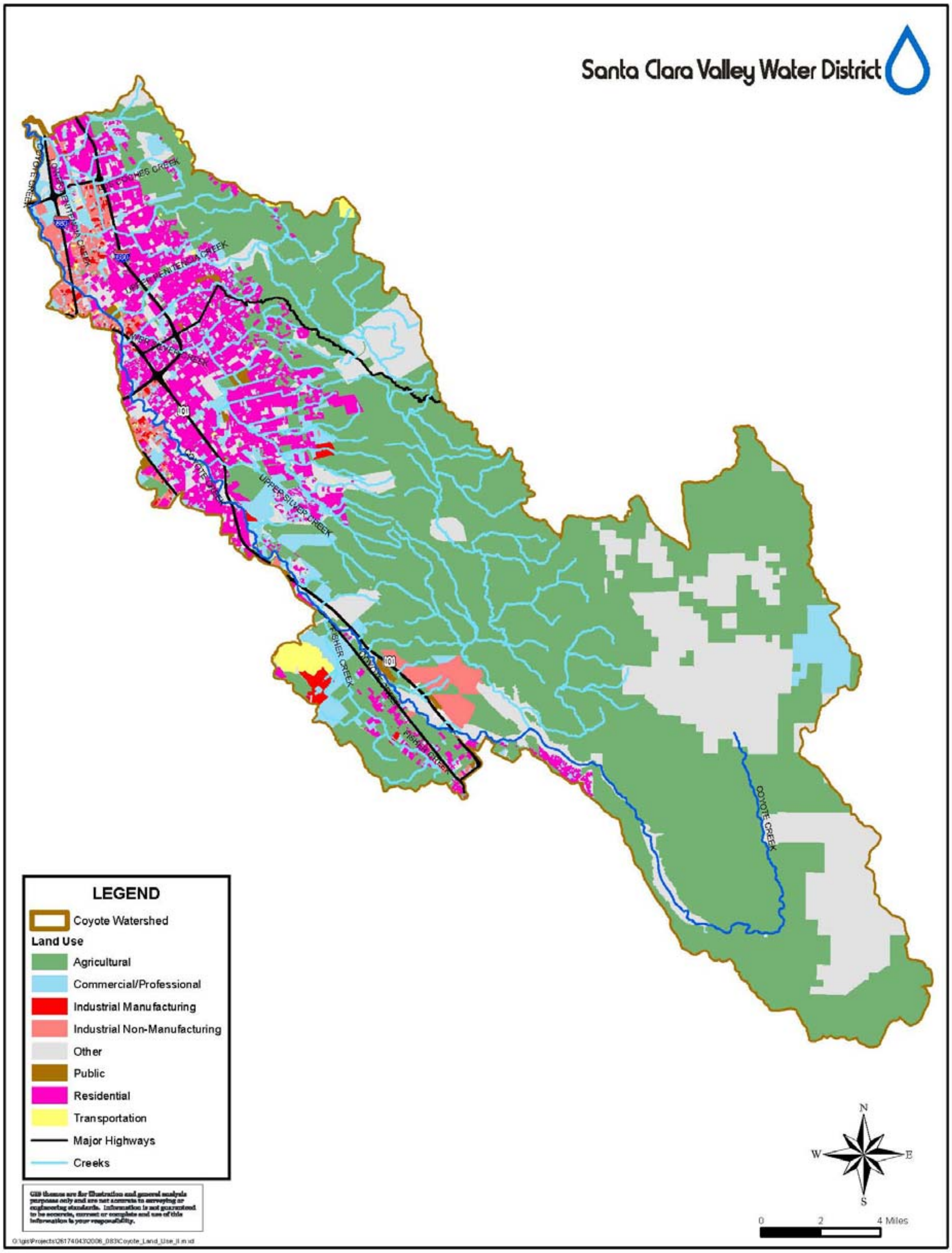
Santa Clara Valley Water District
COYOTE CREEK
LOWER PENITENCIA CREEK
LOS COCHES CREEK
880
680
UPPER PENITENCIA CREEK
LOWER SILVER CREEK
101
COYOTE CREEK
UPPER SILVER CREEK
FISHER CREEK
COYOTE CREEK
101
FISHER CREEK
COYOTE CREEK
LEGEND
Coyote Watershed
Land Use
Agricultural
Commercial/Professional
Industrial Manufacturing
Industrial Non-Manufacturing
Other
Public
Residential
Transportation
Major Highways
Creeks
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Figure 2-2: Existing Land Use in the Coyote Watershed

2.2 PREVIOUS AND CURRENT STUDIES AND IMPROVEMENT PROJECTS

Multiple studies and a capital improvement flood protection project were completed in the watershed before this planning study. A number of new studies associated with this planning study have been conducted and are going within the Coyote Watershed. A brief review and chronological listing of these projects follows.

2.2.1 Previous Studies and Improvement Projects

- Improvement of Coyote Creek — from Trimble Road (Montague Expressway) to Nimitz Freeway (I-880) in Santa Clara County, California (Project No. 40021) 1968, by Creegan and D'Angelo Consulting Engineers for SCVWD (Creegan and D'Angelo, 1968)

  In 1968, Creegan and D'Angelo Consulting Engineers was contracted to prepare construction plans that were referred as "interim improvements" by District staff. In this design, the creek was realigned with a levee on both banks to convey a flow of 14,700 cfs. In addition, the channel slope was designed to 0.0014 ft/ft and the side slopes of the channel were set to 2:1. The construction was completed in 1972.

- Review of Basic Hydrology Methodology for Flood Control — 1976, by SCVWD (SCVWD, 1976)

  Using available stream flow data from and around Santa Clara County, including most of the data within Coyote Creek watershed, the District developed the 1976 regional regression equations for the statistics of instantaneous flood peaks and volumes. Those equations were obtained by regressing the quartiles of flood peaks and volumes of recorded data to the respective watershed and rainfall characteristics. The results of the regression study were compiled in a report that was reviewed by a panel of expert hydrologists and used to develop the District Design Flood Flows Manual.

- Hydrologic Engineering Office Report, Guadalupe River and Coyote Creek, Santa Clara County, California — June 1977, by the United States Army Corps of Engineers (USACE)

  This report presented the hydrologic methods and data used to develop standard project flood and design flood discharges and peak discharges vs. frequency relationships at various index locations throughout the study area for existing and future conditions. In this report, the one-percent flood for Coyote Creek at downstream of Silver Creek confluence for future condition is 14,200 cfs.

- Coyote Creek Planning Study (San Francisco Bay to Montague Expressway) — October 1984, by SCVWD (SCVWD, 1984)

This Engineer's Report presented the results of an investigation of the flood problems of lower Coyote Creek from near San Francisco Bay to Montague Expressway. This study led to creek improvements to provide one-percent level of flood protection. The construction was completed jointly with USACE in 1995.

- Final General Design Memorandum, Charpter12 Hydrology, Coyote and Berryessa Creeks, California — May, 1993, by USACE

  In this memo, USACE adopted and updated the SCVWD's hydrologic model in their latest study in Coyote Creek watershed and restated that the Hydrologic Engineering Office Report developed in June 1977 is still a valid design document for Coyote Creek hydrology.

- Coyote Creek Flood Control Project (Reaches 4-12) — April 12, 1994, by Archaeological Resource Management for SCVWD

  An archaeological research was carried out in this project. This research included an archival background study, field reconnaissance, a test program consisting of backhoe trenching and hand-excavated units, an application of National Register of Historic Places Standards, and a summary of cultural resources.

  Cultural resources have been identified in reaches from Montague Expressway to Charcot Ave, from Berryessa Road to Mabury Road, and from Highway 101 to East Julian Street. Three bridges (Santa Clara Street Bridge, Julian Street Bridge, and Southern Pacific Railroad Bridge) were evaluated to have local historical significance and are eligible to be included in the City of San Jose's Historical Resources Inventory as Structures of Merit.

- FEMA Floodplain Studies — 1998, by Federal Emergency Management Agency (FEMA, 1998)

  In 1998, FEMA published updated Flood Insurance Studies for the City of San Jose to identify current flood hazards.

- Phase I Hazardous Materials Investigation (East Julian Street to East Santa Clara Street) and Phase II Hazardous Materials Investigation (Montague Expressway to East Santa Clara Street) — October 1994, by Kennedy/Jenks Consultants for SCVWD

  The District contracted with Kennedy/Jenks Consultants in June 1993 (Kennedy/Jenks, 1993) to perform a Phase I and II Hazardous Material Investigation to identify areas of potential environmental concerns. The investigation included soil sampling, ground water sampling, creek water sampling, and sediment sampling.

- Coyote Watershed Stream Stewardship Plan — February 2002 by SCVWD

  In 2002, the District completed its Stream Stewardship Plan for the Coyote Watershed to provide a strategic approach for implementing the District's Ends Policy using a watershed management approach within the Coyote Watershed.

  The plan was developed in a collaborative manner between the District staff and local stakeholders through the creation of a short-term work group within the Santa Clara Basin Watershed Management Initiative.

  The plan process includes establishing the plan's vision, goals and objectives, identifying candidate projects to achieve the goals, and ranking the candidate projects on how they best fulfill the goals of the plan.

- Assessment of Stream Ecosystem Functions for the Coyote Creek Watershed—Coyote Creek Watershed Integrated Pilot Assessment Final Report — May 2003 by EOA, Inc. for Santa Clara Valley Urban Runoff Pollution Prevention Program

  Sponsored by Santa Clara Valley Urban Runoff Pollution Prevention Program, the consulting firm EOA, Inc. completed a study (2003) of the Coyote Creek Watershed to assess the creek's physical and biological stream ecosystems, and the biotic integrity of this stream in which a broad range of human impacts occur.

  In the report, the creek reaches were classified using factors related to geomorphology and urbanization. hydrologic processes, channel dynamics, aquatic habitat, riparian habitat, and landscape-level connectivity were assessed. The existing capacities of study area reaches to support aquatic fauna were assessed. Selected water quality parameters were examined. Future and potential capacities of stream ecosystem functions were assessed. Potential management actions were prioritized and monitoring activities to address data gaps identified through the assessment were also described and prioritized.

- Santa Clara Basin Watershed Management Initiative — ongoing, by stakeholders

  To address all sources of pollution that threaten the Bay and to protect water quality throughout the Santa Clara Basin watershed, the Santa Clara Basin Watershed Management Initiative (WMI) was initiated in 1996 by the U.S. Environmental Protection Agency, the State Water Resources Control Board and the San Francisco Bay Regional Water Quality Control Board. A major aim of the WMI is to coordinate existing regulatory activities on a basin-wide scale, to ensure that problems are solved efficiently and cost-effectively.

- Coyote Parkway Lakes Freshwater Wetland Mitigation Project — 2007, by SCVWD

  As part of the required mitigation for implementation of the SMP in 2002, the District has created seven acres of fresh water wetlands. The site is located at the north east corner of the intersection of Monterey Road and Metcalf Road in San Jose. The project construction was completed in 2007.

2.2.2 Current Studies and Improvement Projects

- Environmental Data compilation — 2004, by EOA for SCVWD
- Topographic Survey from Montague Expressway to I-280 — 2003 to 2005, by SCVWD
- Right-of-Way Planning Layout — 2005, by SCVWD
- Hydraulic Modeling for Existing Condition — 2005, by SCVWD
- Preliminary HAZMAT Study — 2005, by SCVWD
- Historical Ecological Study — 2005, by SFEI for SCVWD
- Baseline Fisheries Habitat Study — 2007-2009, by SCVWD
- Biological Resources Assessment — 2006, by EDAW, Inc. for SCVWD
- Mid-Coyote Project Problem Definition Report — 2006, by SCVWD
- HEC-6T Sediment Transport Study Report — 2007, by SCVWD
- Geomorphic Longitudinal Survey — 2008, by SCVWD
- Geomorphic Monitoring Cross Sections Survey — 2008, by SCVWD

2.3 HISTORIC STREAM CHANNEL

The hydrology and geomorphology of Coyote Creek along the valley floor has been highly modified. Flood areas in the watershed have been greatly reduced by past flood control projects that include dam installations, channel straightening, and the construction of levees; however, approximately ten percent of the watershed remains within the FEMA one-percent flood zone.

At the base of the Diablo Mountain Range, the Creek is impounded by two dams, which form Coyote and Anderson Reservoirs. Stream flow from both dams is regulated and runoff above Coyote Dam accounts for about 75 percent of the total runoff for the entire Anderson/Coyote watershed (Iwamura 1999). The nine tributaries that flow into the reservoirs transport sediment from the upper watershed. Most of these sediments are settled in the two reservoirs. The lack of sediments downstream from each of the reservoirs may be a cause of downstream channel instability (i.e., headcuts and lateral migration). Management of flows released from the dams have also reduced peak flows and increased summer flows for groundwater recharge.

Between Anderson Dam and the South Bay, three major percolation pond systems are located within or adjacent to Coyote Creek. The percolation ponds, located two miles below Anderson Dam in Santa Clara County Park property, were historic gravel quarry pits. These ponds were isolated from the natural channel, but connected to the creek in 1997 when a levee bounding one of the ponds was breached. The Coyote Percolation Ponds, just downstream of Coyote Narrows, are pits originally created by gravel mining in the natural channel and are now managed by the District as a ground water recharge system. A permanent concrete dam was built in the 1930’s to increase the size of these ponds. In 1999, a fish ladder was constructed to allow passage over the dam.

The boundary between the Diablo Mountain Range and the alluvial plain that forms the valley floor is sharply defined. At least five major tributaries (Fisher Creek, Upper Silver Creek, Lower Silver Creek, Upper Penitencia Creek, and Lower Penitencia Creek) flow from the mountains across this alluvial plain to Coyote Creek. Approximately 68 storm drain outfalls from the cities of Morgan Hill, Milpitas and San Jose also contribute flow to reaches of Coyote Creek below Anderson Dam (SCVURPPP, 2001).

The urbanized area of Coyote Creek watershed has dramatically increased since the 1960's (SCVURPPP, 2001). During this time, population has increased greatly, and agricultural and grazing lands have been converted to residential communities in the southern region of the Santa Clara Valley and along the base of the Western Diablo Mountain Range.

The lower reaches of Coyote Creek have been partially modified for flood protection. Setback levees and a high bypass channel have been constructed in the lower reach of Coyote Creek. In addition, several miles of tributary stream channels have been similarly modified, including the lower portions of Upper and Lower Penitencia, Berryessa, Lower and Upper Silver Creeks.

As Coyote Creek nears the South Bay, a transition occurs from a freshwater environment to an estuarine environment where the channel and adjacent baylands contain many acres of brackish marsh, salt marsh and mudflats.

Within the Coyote Creek Montague Expressway to I-880 project limits, the creek has been modified in 1970's. The center line of the creek was realigned and the levees on both banks were constructed to convey a flow of 14,700 cfs. The field survey performed in 2003 indicated that degradation has occurred at upstream of Montague expressway bridge, about 2000 feet long, while aggregation can be seen for the rest area.

2.4 HISTORY OF FLOODING

Flooding has occurred along portions of Coyote Creek in 1911, 1917, 1931, 1958, 1969, 1982, 1983, 1997, and 1998. The largest flow recorded on Coyote Creek was 25,000 cubic feet per second (cfs) in 1911, and was recorded prior to construction of the two water-supply reservoirs.

Since the construction of Anderson and Coyote Reservoirs, the largest flow in the creek was estimated to be 7,500 cfs on January 26 and 27 of 1997. Coyote Creek topped its banks at numerous locations and caused damage to private and public property and transportation routes (Figures 2-3 through Figure 2-5).

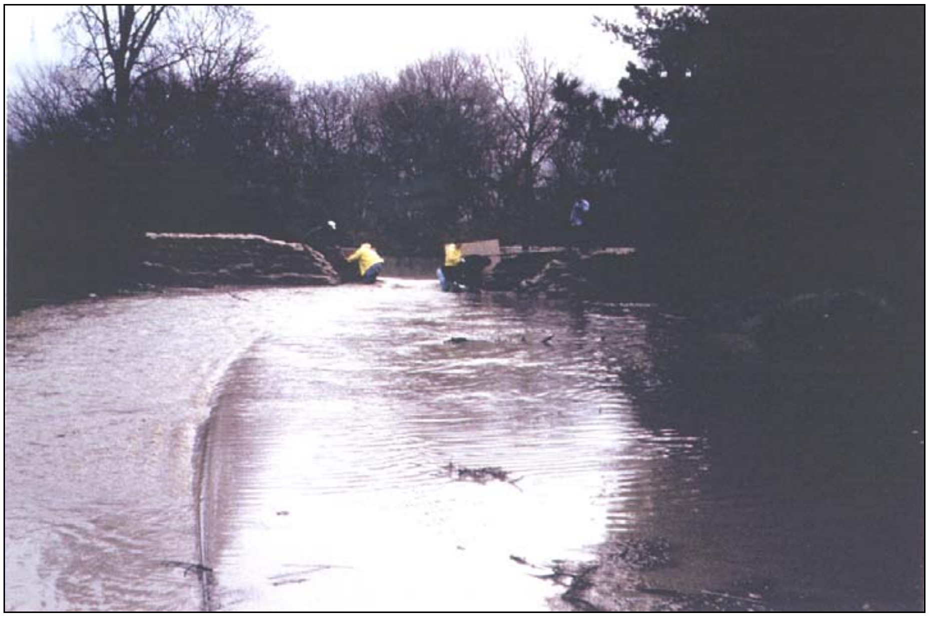

Figure 2-3: Sand Bagging to Arrest Coyote Creek Flooding at the Railroad Spur, Jan. 26, 1997 (Reach 8, Station 135+00).

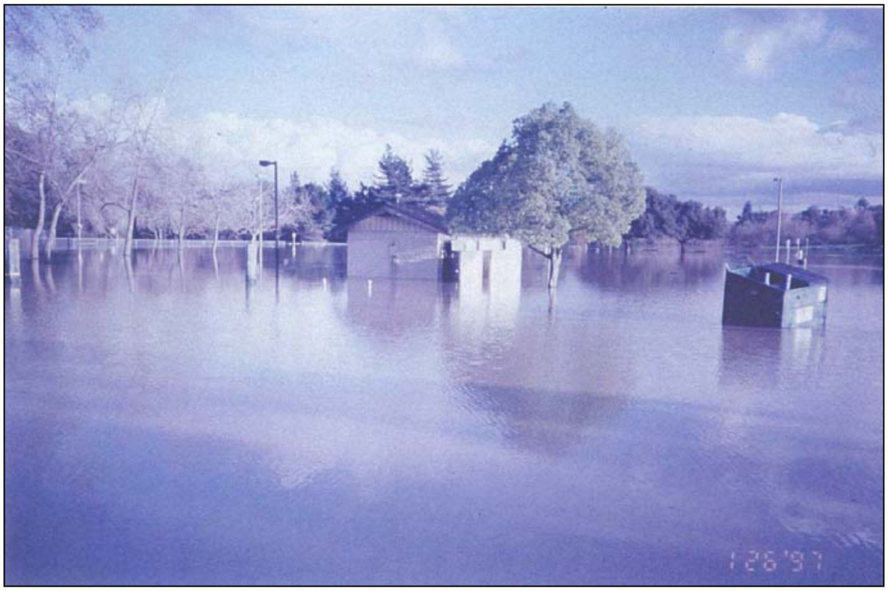

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Figure 2-4: Coyote Creek Flooding at Watson Park, Jan. 26, 1997 (Reach 11, Station 202+00).

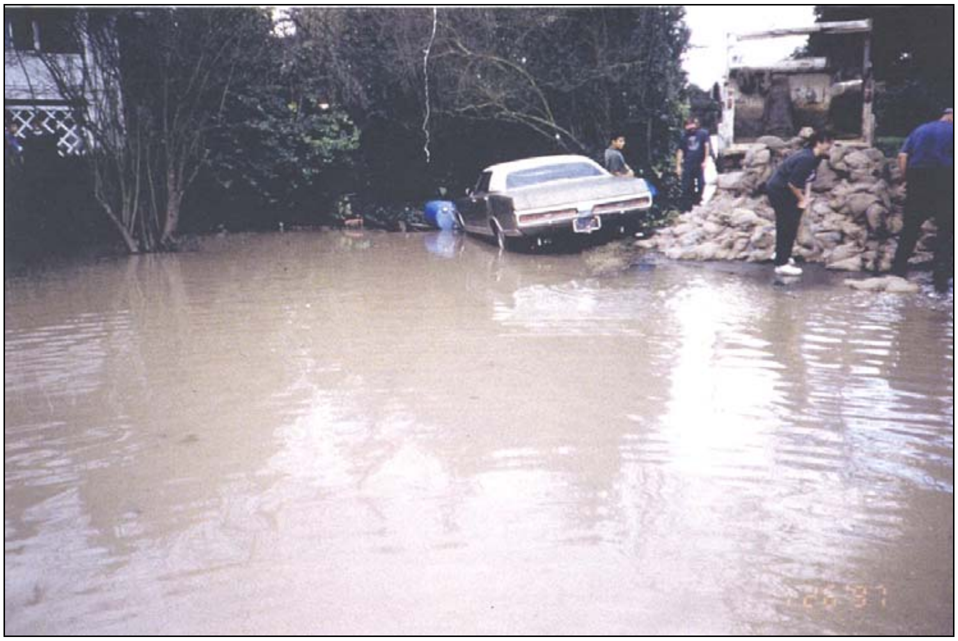


Figure 2-5: Coyote Creek Flooding Just Downstream From William Street, Jan. 26, 1997 (Reach 13, Station 289+00). Note that this is the location where the Coyote Outdoor Classroom was later constructed.

2.5 HYDROLOGY

Coyote Creek drains the western side of the Diablo Mountain Range. The watershed covers the area from the county boundary in the north to Kickham Park in the south. The upper reaches of the creek are controlled by two reservoirs: Coyote (built in 1936) and Anderson (built in 1950).

The watershed tributary to Coyote Reservoir is about 118 square miles or 37 percent of the total Coyote Watershed area, and it is drained by the east and middle forks of Coyote Creek that join near Soda Spring Canyon to form the Upper Coyote Creek. From there, the creek flows south to a point near the Canada De Los Osos where it changes direction and flows north to Coyote Reservoir. The watershed tributary to Anderson Reservoir is about 122 square miles or 38 percent of the total Coyote Watershed area, and it is drained by Shingle, Las Animas, and San Felipe Creeks. The flow pattern of these creeks is southeasterly until it reaches Anderson Reservoir. Downstream of Anderson Reservoir, the flow of Coyote Creek is mainly towards the north where it travels a distance of more than 50 miles before reaching the Bay. Fisher, Silver, and Penitencia Creeks are also tributaries of the Coyote Creek. Stream flows are regulated extensively in Coyote Creek. Downstream of Anderson Reservoir, water is diverted into a 6-mile canal that parallels the stream channel. This water is discharged for ground water recharge in Metcalf Pond and the Ford Road ponds; consequently, the reach between the canal intake and Metcalf Pond runs dry in all but the wettest years. Downstream of the percolation ponds, the stream channel often runs dry, or only intermittently during most summers (WMI, 2003).

The Coyote Watershed has warm, dry summers and mild, wet winters, which is typical of a Mediterranean climate. The mean annual precipitation ranges with elevation from a low of 14.5 inches on the valley floor to a maximum of 28.0 inches near Mount Sizer (elevation 3,217 feet). There are ten rainfall stations that collectively represent the precipitation patterns of the watershed.

In June 1977, the San Francisco District of the Corps issued a preliminary office report, "Hydrologic Engineering Office Report, Guadalupe River and Coyote Creek". Following the preliminary report, a memorandum/confirmation letter was sent out on October 20, 1977, stating that District, Army Corps of Engineers and the Federal Insurance Administration had reviewed the design flows and agreed on 14,500 cfs for one-percent flow event in Coyote Creek at down stream of Lower Silver Creek to Highway 880. In 2009, the District completed modelings of a few of hydrology scenarios in the Coyote Watershed and recommended new 100 year design flows at different locations. The 100 year design flow would be 17,100 cfs in this project.

2.6 GROUND WATER

The ground water system in the Santa Clara valley is divided into two interconnected sub-basins. The northern sub-basin is the Santa Clara sub-basin. This sub-basin is the primary source of ground water for the Santa Clara Valley. The Coyote sub-basin underlies the southern part of the valley, south of the Coyote Narrows. The Coyote Narrows is where the Diablo Mountain Range and the Santa Cruz Mountains converge and constrict ground water flow to the Santa Clara sub-basin.

The ground water sub-basins are composed of gravels, sands, and silty sands that have washed down from the mountains into the valley. Because the valley floor consists of this material, it is very permeable and forms good aquifers, or water-bearing layers of sand and gravel. The aquifers in the basin are capable of producing large amounts of ground water to wells. The water quality of the aquifers is good to excellent, and therefore is suitable for most uses, such as drinking water.

The Santa Clara sub-basin is divided vertically into two major aquifer zones, separated by an aquiclude, or thick layer of impermeable clay. This layer of clay prevents ground water movement between the two aquifer zones and is found at a depth of approximately 150 feet throughout the sub-basin. The aquifer zone on top of the aquiclude is considered to be unconfined, whereas the aquifer beneath the aquiclude is a confined aquifer. The unconfined aquifer is currently not used for water supply, but could be used under emergency conditions.

The Coyote Valley sub basin contains the same type of alluvial material as the Santa Clara sub basin. Most of the water-bearing alluvial deposits in the valley came from Coyote Creek as entered the valley from the Diablo Mountain Range. Groundwater occurs in these deposits as an unconfined aquifer, at a depth of 10 to 40 feet. Just upstream of Coyote Narrows, the groundwater discharges into Coyote and Fisher Creeks because of the groundwater rising over the constriction there.

Streams in the foothills of the Santa Cruz Mountains from Morgan Hill northward to Atherton receive water from smaller groundwater basins. The groundwater percolates through fractured bedrock and fault zones, maintaining the summer streamflow and the riparian habitat that depends on it.

The Santa Clara Valley drainage basin is a structural trough, bounded by the Santa Cruz Mountains to the southwest, and the Diablo Mountain Range to the northeast. Ground water flows into the aquifer from the mountain ranges and then towards San Francisco Bay. In the low foothills at the edge of the Santa Clara sub-basin, the aquifer material is exposed at the ground surface. These areas are collectively known as the “forebay” of the aquifer. These exposed areas allow for water such as rainfall or streamflow to infiltrate and seep into the aquifer. Water also enters the aquifer at the valley margins through infiltration from small mountain streams, and by rainfall that falls on the valley floor. The Hayward Fault in the Diablo Mountain Range bounds the ground water and prevents it from flowing away from the valley to the east.

In 1915, the water surface elevation of the ground water was above the land surface elevation throughout much of the valley. This resulted in free flowing water, or artesian wells, which were common. However, by 1967, the increase in ground water withdrawals and drought conditions caused the water levels to drop up to 200 feet from their 1915 levels in some parts of the valley. Because the water levels were drawn to below sea level, seawater was drawn into the aquifer system. The saltwater intrusion was detected in wells up to 10 miles inland (USGS, 2001).

The District has on-stream and offstream ground water recharge facilities in the Coyote Watershed. On-stream recharge occurs when rainfall or water is released from a reservoir to a stream, and the water is able to seep downward into the aquifer through the gravel streambed. Between Anderson Reservoir and the Coyote Narrows, flows into Coyote Creek are an in-stream source of recharge to the Coyote Creek groundwater basin.

Offstream facilities include percolation ponds. These are ponds of water that are held over sandy gravel beds naturally occurring in the watershed. The three main ground water recharge areas are the Penitencia, Overfelt, and Coyote ponds. The Penitencia percolation ponds receive water from Lower Penitentia Creek. The Ford Road and Coyote ponds receive water from Coyote Creek, Anderson Reservoir, and the San Felipe Project (San Felipe Division of the Federal Central Valley project). Penitencia, consisting of three ponds totaling 20 acres, and Overfelt, consisting of four ponds totaling 6 acres, are both in East San Jose. Ford Road has four ponds totaling 34 acres, and Coyote has one 30-acre pond in South San Jose.

2.7 LAND SUBSIDENCE

Due to significant pumping of the ground water, Santa Clara basin started around the turn of the twentieth century and continued to increase until 1965. As ground water pumping increased, eventually leading to a condition of overdraft, the water table began to decline steadily in the forebay and upper aquifer zone and the artesian flows from the lower aquifer ceased as ground water pressures declined. A decline in the artesian pressure resulted in compaction of lower aquifer zone sediments and eventual land subsidence. Most of the compaction occurred in fine grained silt and clay deposits (aquitards), which are more compressible than the coarse grained aquifer materials. In some locations, the land subsided as much as 13 feet.

Overdraft ceased in 1965 with the importation of surface waters from the State Water Project and City of San Francisco’s Hetch Hetchy system. Increased imports of surface water allowed the District to greatly expand the ground water recharge program, leading to the substantial recovery of ground water levels. Land subsidence ceased in 1969 as a result of ground water level recoveries and development of artesian pressures in the lower aquifer zone. In most recent years, pressures in the lower aquifer zone have recovered to the extent that wells within the basin interior have again become artesian and now flow on an intermittent seasonal basis. However, ground surface elevations within the forebay and in certain large pumping areas within the basin have not recovered to their pre-overdraft levels because the compression of clay underlying the Santa Clara Valley is irreversible.

Within Coyote Creek from Montague Expressway to I-280, historic subsidence has also brought adverse impacts to the creek. Figure 2-6 illustrates changes to the project reach invert since 1933. Subsidence has effectively flattened the creek profile in the project reach which has reduced the creek’s hydraulic capacity and has also caused low flow water ponding to occur, which is detrimental to the creek’s water quality.

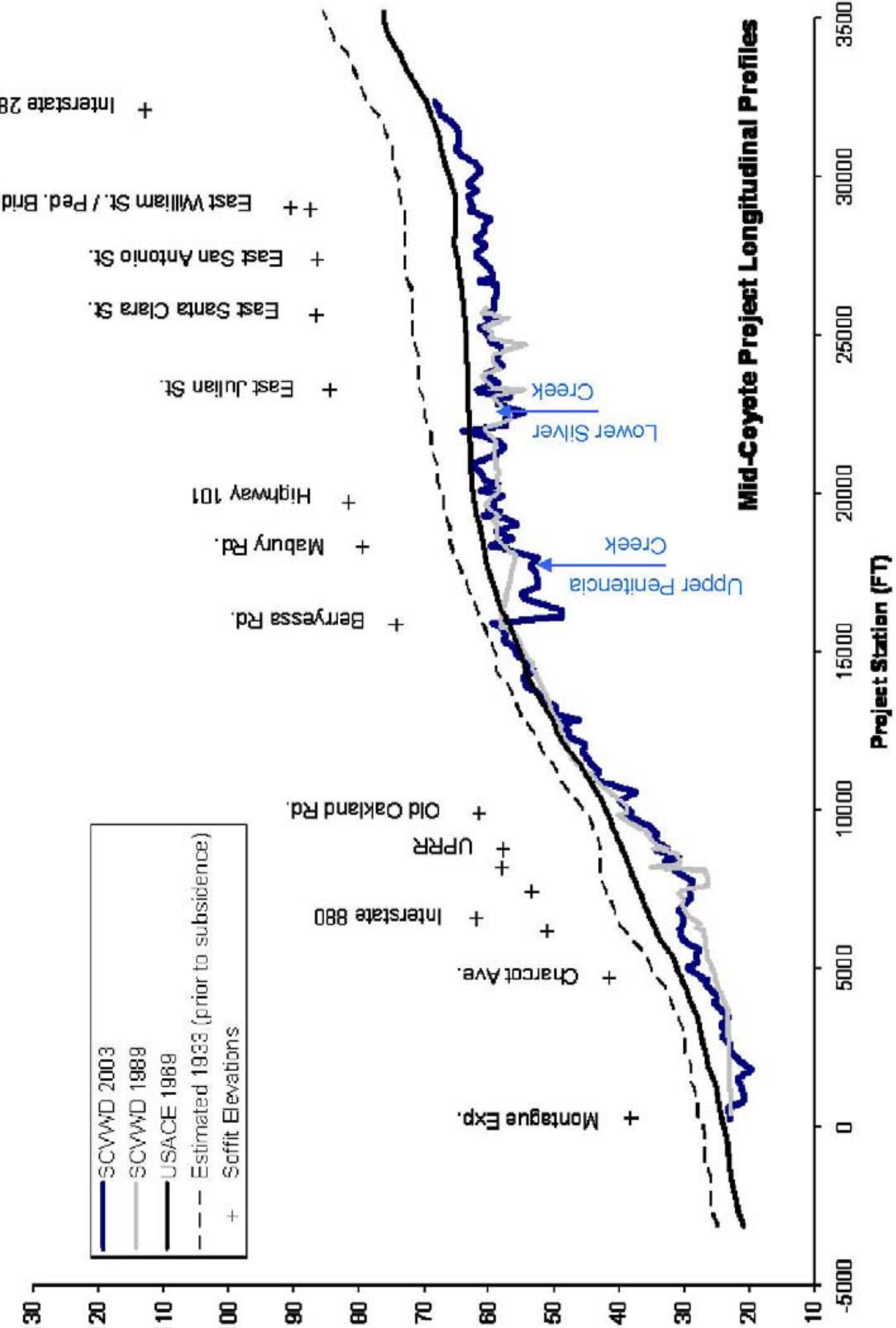


Figure 2-6: Land Subsidence Impact on Coyote Creek Invert Profile

2.8 ENVIRONMENTAL SETTING

In preparation for this project and planning study, the District conducted a Biological Resource Assessment in 2006 (EDAW Inc., 2006) to document existing wildlife conditions from Montague Expressway to I-280. The following information was extracted from the report to provide an overview of the environmental setting in the project area.

Wildlife habitat values are discussed in a qualitative manner, because systematic surveys of wildlife use were not conducted as part of this assessment. Therefore, quantitative conclusions regarding use of different reaches by various wildlife species cannot be drawn. However, vegetation conditions within the Coyote Creek corridor and adjacent land uses are primary factors that influence wildlife use and habitat values and can be evaluated on a qualitative basis. Key vegetation conditions include the diversity of vegetation communities (e.g., woodland, grassland, marsh, etc.), the diversity in plant species and structure (e.g., trees, shrubs, ground cover) within a community, and the presence and distribution of nonnative vegetation. In general, greater diversity in these communities and in the species and structure that makes up the community supports a more diverse wildlife assemblage.

From Montague Expressway to Charcot

Vegetation

This reach is about 5,100 feet long, covers 20.58 acres, and includes 8 distinct vegetative community types. The dominant plant community is Annual Grassland-Ruderal, which occupies approximately 6.07 acres along the mid to upper levee banks and smaller open areas within the woodlands. The largest open areas exist around the Montague Expressway overpass, with substantial linear bands persisting south (upstream) along the banks. Dominant species include ripgut, wild oats, and in a few areas, smilo grass; less dominant but common species include radish, and bull mallow. The dominant tree community is Introduced Willow Woodland, which consists of weeping willow and occupies approximately 5.64 acres of lower channel banks, especially along the western side of the creek. Walnut trees make up a substantial amount of the canopy fringe and are also mixed within the forest, as is box elder, and to a lesser degree, blue elderberry. Patches of Cottonwood-Willow Woodland are present throughout the reach, mostly occurring on the eastern bank, and account for approximately 2.95 acres of habitat; the community begins to appear more frequently as the reach approaches Charcot Avenue. Smaller patches of Arroyo Willow Scrub are mixed into both woodland communities throughout the reach, and an unusual and unidentified oak tree is locally abundant downstream, along mid and upper portions of the west levee, but becomes scattered and eventually rare moving southward.

Primarily scoured zones of Freshwater Wetland are present as narrow linear bands along the water's edge in most of the reach. Wetland vegetation includes cattails, California tule, and perennial peppergrass, most of which is coming up as new growth. Due to the open nature of the reach, continuous Open Water habitat is visible throughout the majority of the reach. The Freshwater Marsh and Open Water combined account for 3.88 acres of habitat within the reach.

A large area of Introduced Eucalyptus Woodland occupies the east bank just south of Montague Expressway. Much of the woodland is outside of the riparian corridor mapped in the field effort; however, 0.53 acres were mapped along the top and middle bank. Further upstream along the upper east bank, several palm trees exist, and remnants of others that were apparently cut down, occupy the bank. The remainder of the reach consists of Disturbed areas (bare ground and rock fortified bank) and roads, mainly around the levees near the Montague Expressway overpass.

Wildlife

Wildlife habitat values in this reach are moderate to high. This reach supports a riparian corridor that is relatively high in species and structural diversity. The west side of the creek supports substantially higher quality habitat than the east side, primarily because of a wider riparian strip, better shrub diversity, and fewer nonnative trees. Another asset of this reach is the areas of freshwater marsh, which is uncommon along Coyote Creek. As a result, this is one of few reaches upstream of Montague Expressway likely to support birds that are typically associated with marsh habitats, such as herons and egrets. Disturbance from adjacent commercial and industrial development along this reach is relatively high, particularly near the fuel distribution facility on the west side.

From Charcot to Interstate 880

Vegetation

This reach is about 1,800 feet long and covers 8.94 acres. Of the 5 distinct plant communities within the reach, Cottonwood Willow Woodland is the most dominant (3.40 acres), followed by Annual Grassland-Ruderal (3.23 acres) and Introduced Willow Woodland (1.71 acres). Initially moving south from Charcot Avenue, the Cottonwood Willow Woodland exists as patches along the west side of the channel, while the Introduced Willow Woodland dominates the majority of the low channel area; however, approximately one-third of the way upstream, the Cottonwood Willow Woodland becomes dominate in the low channel area, especially on the west side, and the Introduced Willow Woodland community is reduced to small scattered patches along the west bank. In the now dominant Cottonwood Willow Woodland, and occasionally in the Annual Grassland-Ruderal community, associated woody species frequently observed include arroyo willow, walnut, box elder, California sycamore, and blue elderberry; while understory associates are typically goose grass, ripgut, Italian thistle, and other grasses.

A few coast live oaks were observed in the Annual Grassland-Ruderal community throughout the reach, but were not mapped as a distinct community. The Annual Grassland-Ruderal community occupies a linear band along the entire length of the east bank, with the band increasing substantially in width moving south from Charcot Avenue to I-880. Additionally, a narrow linear band of the Annual Grassland-Ruderal community occupies the downstream section of the west bank, and an even larger area exists on the west side, between O'Toole Avenue and I-880. A small area of Coyote Brush Scrub occupies the upper bank on the east side of the channel, immediately south of O'Toole Avenue, and a small scoured area of Freshwater Wetland, with the same plant species seen in reach from Montague to Charcot, exists immediately upstream of the Charcot Avenue overpass.

Wildlife

Riparian habitat values of this reach are similar to those of downstream reach, although there are generally more large trees and less shrub and ground cover. The highest quality riparian habitat is concentrated on the western side of this creek where an overflow channel is present along much of the reach. When water is present (e.g., after high flow events), this channel could provide higher quality habitat for amphibians and aquatic reptiles than the main channel does. Also of note is a patch of upland scrub vegetation on the eastern side of the creek just downstream of O'Toole Avenue. In combination with the adjacent riparian, this vegetation species and structural diversity enhances the overall wildlife habitat quality and may support some additional species that do not typically utilize the riparian woodland. The lowest quality habitat is along the very disturbed portion between O'Toole and I-880.

Aquatic Habitat

Coyote Creek historically supported the most diverse fisheries assemblage in the South San Francisco Bay. At least eighteen native fish occur in the historic records for the Coyote watershed (Leidy, 1984). Deterioration of habitat quality has resulted in the local extermination of some native fish in the Coyote Watershed.

Coyote Creek still supports a run of anadromous (migrating from the sea to fresh water to spawn) rainbow trout (steelhead), which was listed as threatened under the Endangered Species Act in 1997. The National Marine Fisheries Service (NMFS) revised the critical habitat for steelhead in 2005 and included Coyote Creek mainstem to Anderson Dam and the Upper Penitencia tributary to Cherry Flat Reservoir as part of that designation (Federal Registry, 50CFR Part 226). The project reaches are included in the boundaries of critical habitat for steelhead.

It would be difficult to assess existing aquatic conditions without describing a myriad of factors that affect the hydrology, geomorphology and, consequently, the quality of aquatic habitat in the project reach. The reservoirs above the project site effectively reduce the amount of sediment transported downstream, which has affected the creek's width to depth ratio below the dams. Changes in the width to depth ratio are correlated with changes in aquatic community composition as well as fish distribution and abundance (Murphy et al, 1996). Management of flow for flood control reduces peak discharge in the winter and spring while ground water recharge releases from the reservoirs increases summer flows. Stream flow from both dams is controlled between April and October. Hydrologic fluctuation can have significant effects on biological assemblages downstream of dams.

In addition to reservoir effects, there are other factors influencing the distribution and abundance of native fish in the project area. These factors include historic gravel mining, channel modifications, introduced fish, amphibians and reptiles, water diversions, urban development which includes outfall pumping, and increased impervious surfaces. All of these factors contribute to poor water quality and have cumulative deleterious effects to aquatic environments.

Urbanization has complex effects on water bodies. Similar to the previously described impacts to wildlife, it would be difficult to determine which activity has the most impact to instream function. Alteration of surrounding landscapes, disconnection of stream from floodplain, changes in watershed imperviousness, changes to the quantity and timing of runoff, historic gravel mining in the watershed, reservoirs trapping sediment, water diversions and groundwater management cumulatively affect the hydrology of the project reach. As a result of these hydrologic changes, the stream channel configuration (width, depth, meanders, riffle/pool lengths) changes in response (SCVURPPP, 2001). Artificial hydrologic function can have considerable influence on biological communities and in California, non-native fish are most abundant in aquatic habitats that have been modified by human activity (Moyle, 2002).

Hazardous Materials

The project area is closely bordered by industrial or commercial facilities. Project excavations in these areas have a greater probability of unearthing hazardous soils and/or contaminated ground water. A preliminary Hazardous Substance Liability Assessment (HSLA) report was prepared by District in 2004 (SCVWD, 2004a). The report was based on site reconnaissance inspection of the project area and a review of environmental database documents. A description of the HSLA reconnaissance areas of concern follows.

The fuel tank farms located within project reach (Figure 2-7) are a potential soil and ground water contamination site. These facilities include large fuel tanks located on either side of the creek, subterranean pipelines that cross beneath the creek, and a truck filling station.

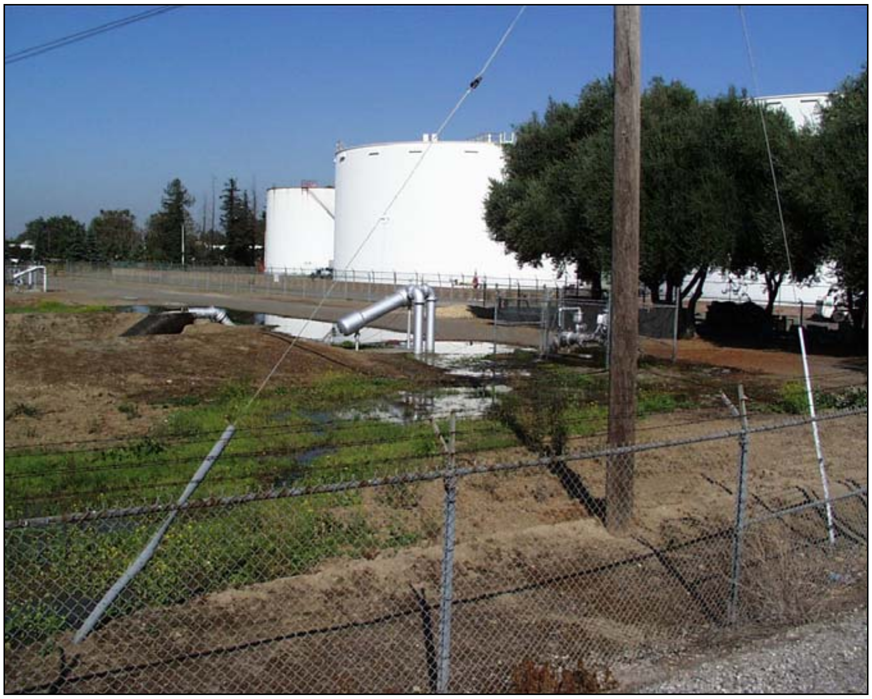


Figure 2-7: Looking Downstream at Coyote Creek's West Bank and a Partial View of the Fuel Tank Farm Located Approximately 850 Feet Downstream from the Charcot Avenue Bridge, Sep. 30, 2003 (Station 38+17).

The Santa Clara County Road and Airport Division maintenance yard and fueling station, located in project reach, is a potential soil and ground water contamination site. This facility is located adjacent to Schallenberger Road along the west bank of the creek between the UPRR and O'Toole Bridge crossings.

In addition to the areas listed above, the HSLA report also indicated that homeless encampments near the creek and garbage collections or trash rafts located within the creek channel were sources of hazardous materials within the project area.

The District's HSLA included a review of environmental documents within the project area that was based upon a database prepared by Environmental Data Resources, Inc. (EDR) (SCVWD, 2004a). The EDR report examined environmental records within a one mile distance from both sides of Coyote Creek in the project area. Numerous surrounding sites were identified as potential sources of contamination (Table 2-7). Details of the potentially contaminated sites that may have impacts on project reach are presented in the EDR report.

TABLE 2-1
Potential Hazardous Material Sites Near the Project Reach

	Site Name	Location	Distance (miles)	Category
1.	Van Waters & Rogers	2256 Junction Ave.	0.5	Potential NPL, multiple sites
2.	PCB Engineering Inc. Avenue	572 Charcot Ave.	0.1	Pesticide list
3.	Quebecor Printing San Jose Inc.	696 East Trimble Rd.	0.5	Potential NPL, multiple lists
4.	Valley Automated Fuels	2132 O'toole Ave.	0.3	UST
5.	Montague Sealy	691 Montague Exp.	0.1	VCP (DTSC oversight
6.	G&K Services	2275 Junction Ave.	0.5	Dry Cleaner

Notes:

Distance:	Refers to the linear distance as measured from the site to Coyote Creek.
Dry Cleaner:	Business activities may include the use of hazardous materials.
DTSC:	Department of Toxic Substance Control.
NPL:	Also know as Superfund. Data provided by the United States Environmental Protection Agency.
UST:	Underground Storage Tank. Data provided by the State Water Resources Control Boar's Hazardous Substance Storage Container Database.
VCP:	Voluntary Cleanup Program. Under the Department of Toxic Substance Control.

Water Quality

Coyote Creek has had significant alterations to the hygrograph coupled with numerous other types of anthropogenic disturbances. All of which has contributed significantly to the degraded water quality which is seen today within the project reach. The creek is susceptible to flashy flows due to the rapid transmission of rain runoff over paved surfaces and through storm drains that quickly transport water and many urban pollutants to the creek. This urban runoff tends to flow to the creek with very limited sediment and significant energy. This sediment limited water tends to encourage both bed and bank erosion of the main channel. The substrate of Coyote Creek through the project area is predominantly sands and silts which are easily eroded and when in suspension tend to be the most deleterious to fish. Contaminants tend to preferentially adhere to these fine grained sediments as well. Water quality is also affected by the abundance of trash in the runoff system which accumulates at various locations in the creek.

Several studies have been conducted that focus either directly on the water quality of Coyote Creek (Tetra Tech, 2001, Hopkins et al, 2002) or more regionally on the stream ecosystem functions for the Coyote Creek Watershed (Buchan and Randall, 2003). These papers stated significant concerns for this section of Coyote Creek as elevated temperature and “extremely high pathogen levels”. Authors also evaluated the water quality at the time of the studies to evaluate how the addition of recycled water discharges would possibly affect the existing water quality in the creek and concluded that the water quality would be improved by the augmentation of recycled water.

Water quality varies within the project area due in part to confluences with tributaries, the creek's low invert gradient slope and consequent decreased and flow velocity, non-point and point source pollution, and riparian canopy cover.

In the following, a few of the key factors that impact the water quality throughout the project limits are discussed.

Temperature

Water temperature data was collected within the project limits to establish baseline temperature conditions prior to any vegetation removal or instream work. Although the project reaches are densely shaded, water temperatures are elevated (>20°C low flow condition) throughout the project reach.

Pathogen Levels

Previous water quality studies have determined elevated pathogen levels at multiple locations within Coyote Creek and are likely caused by a combination of resident waterfowl populations, human (homeless) or animal (pet) waste, or leaking sanitary sewer pipelines.

Sediment

Sediment issues are a common challenge in urban streams as the stream has not reached a state of dynamic equilibrium in response to hydrologic changes brought on by an increase in impervious surfaces within the watershed and by a reduction of large sediment substrate available to work its way through the stream channel due to the construction of dams, wiers, stream gauges and any number of other stream channel modifications. Project reaches near the confluences of Upper Penitencia Creek and Lower Silver Creek exhibit high turbidity which could be caused by several factors. Two likely factors are high sediment input from the tributaries and channel scouring or bank erosion upstream from the project area. Once sediment has entered the creek system, it typically remains suspended in areas with higher velocities and settles out where velocities become slow (i.e. in deep pools).

The size and land use within the catchments for contributing tributaries also affects water quality within the project area. Concentrations of pollutants are generally higher in areas with greater percentages of impervious surface. Pollutants are more easily loaded and carried to the receiving waterway from impervious surfaces than from natural surfaces (Soller, 2004). First flush events (first significant rain event following an extended dry period) have minimal hydrologic difference from subsequent storm events, however, pollutant concentrations are significantly elevated with copper and zinc from road ways and hydrocarbons from parking lots, roadways and driveways (SCVWD, 2006). Additional pollutants are transported to Coyote Creek throughout the year by constant urban runoff associated with over watering of lawns, car washing, and other domestic water use.

Pesticides and Herbicides

Detection of organophosphorous pesticides, specifically Chlorpyrifos, Diazinon, and Malathion, are relatively common in Santa Clara Valley streams, including Coyote Creek. The entire length of Coyote Creek is on the Federal Clean Water Act, Section 303(d), List of Water Quality Limited Segments (303(d) List) as impaired due to Diazinon. Recent sampling found 57 of 112 samples contained detectable levels of these pesticides (Soller, 2003). Concentrations Diazinon (a pesticide) should decrease over time because use of the chemical has been banned in California. Whether or not Diazinon will continue to be an issue in the project area will depend on the level of deposition of the chemical into creek sediments and mud within the project reach.

Anions

Areas with primarily agricultural land uses contribute to an increased amount of anion pollutants. Anions such as chloride, phosphate, nitrite, nitrate and sulfate are greater in agricultural land use areas as compared to more urbanized or mixed-use areas. A relatively constant contribution of these pollutants can be expected from agricultural areas draining to Coyote Creek as first flush events do not typically contribute greater concentrations of these pollutants compared to subsequent storm events.

Metals

The influx of metals to the San Francisco Bay from Coyote Creek and other Santa Clara streams is a concern. The Basin Plan for the San Francisco Bay is the master policy document that contains descriptions of the legal, technical, and programmatic basis of water quality regulation in the San Francisco Bay region. The Basin Plan contains water quality standards for ten metals: arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc. Concentrations of these metals in Coyote Creek are inversely proportional to water hardness (caused by dissolved calcium, magnesium and other metals) which decreases with distance from the San Francisco Bay. In general, metals do not contribute to the impairment of water quality in Coyote Creek (Tetra Tech, 2001).

In general, the project reach has relative high flow, high dissolved oxygen, and low turbidity due to flow augmentation from Upper Penitencia Creek and groundwater return flows. Ammonia concentration was highest in this reach (0.07 mg/L).

2.9 CULTURAL RESOURCES

The Santa Clara Valley as a whole is rich in archaeological sites, and buried sites with little to no surface evidence are common; many of the valley’s known sites were discovered during construction projects, and a comparison of sites in the downtown San Jose/Santa Clara area showed that slightly more than half of the area’s known sites occurred in buried contexts. There are several reasons for this: sites may be buried by sediments or may have been scoured by erosional processes, and because of the area’s dense development, many sites are likely concealed beneath pavement. Episodic flooding and sedimentation may have capped buried sites to depths exceeding modern construction, and previous subsurface disturbances may not be as extensive as supposed. This is particularly true of areas adjacent to watercourses, thus the project corridor is generally considered to have a moderate to high potential to contain buried archaeological resources (Hylkema, 1996).

An archaeological research report completed for the project area indicated that no known archaeological sites have been recorded within the project footprint (ARM, 1995). However, cultural resources including historic ceramics, glass, dietary material, and recent trash were noted on the east levee near Montague Expressway. The archaeological research report recommended that a qualified archaeologist monitor excavation activities between Montague Expressway and 300 meters upstream of the expressway (ARM, 1995).

Two bridges, Charcot Avenue and O’Toole Avenue, cross Coyote Creek in the project corridor. Both bridges were evaluated for their historic or historical architectural significance by the California Department of Transportation (Caltrans) in 1987. Caltrans determined that both bridges were ineligible for the National Register of Historic Places (Caltrans, 1987). Caltrans concluded both bridges had little historical interest, and were also not eligible for inclusion in San Jose’s *Historic Resources Inventory*. No additional structures of historic or historical architectural significance were identified in the project corridor.

CHAPTER 3. PROBLEM DEFINITION

3.1 FLOODING PROBLEMS

A HEC-RAS model was used to determine locations where flood waters are first expected to overtop Coyote Creek's banks (i.e. conveyance capacities) within the project limits. A detailed description of the HEC-RAS model used for this study has been documented (SCVWD, 2004d). Figures 3-1 illustrates a few locations where the floodwater would overtop the banks first.

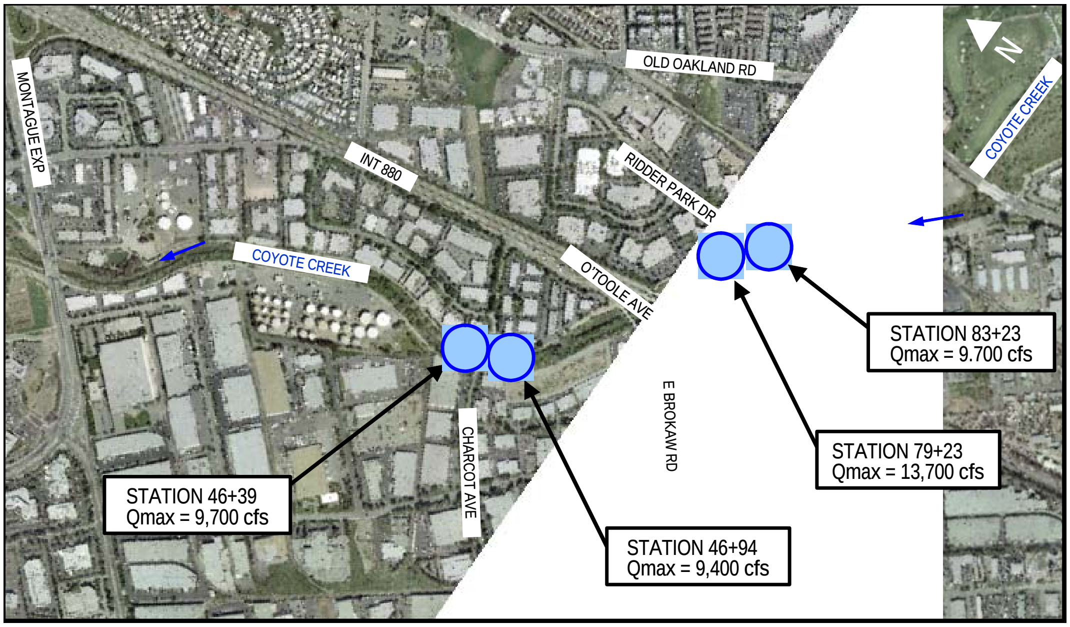


Figure 3-1: Coyote Creek Break-Out Locations near I-880

The HEC-RAS model was also used to determine maximum capacities for the four bridges within the project area (SCVWD, 2004d). Table 3-1 lists maximum bridge capacities and their corresponding return intervals.

TABLE 3-1
Estimated Bridge Capacities
Within the Project Reach

Bridge	Estimated Capacity (cfs)	Estimated Return Interval (Yrs)
Montague Expressway	13,443	50-70
Charcot Avenue	7,777	5-7
O'Toole Avenue	17,000	100
Interstate 880	17,000	100

Note: Capacity calculated at lowest top of bank elevation

In summary, our hydraulic modeling indicates that from Montague Expressway to I-880, the creek does not have enough capacity to convey the one-percent design flow (17,100 cfs). Also, Charcot Ave bridge would constrict flow during such an event.

3.2 WATER QUALITY PROBLEMS

Poor water quality within the project reach is exacerbated by: pollutants from paved surfaces that are transported by rainfall runoff, impaired tributaries, and a flat stream profile. Homeless encampments within the project site also contribute to the degraded water quality with the introduction of trash, debris and human waste. Poor water quality indicators that are detrimental to native ecosystems include: elevated water temperatures and turbidity, high pathogen concentrations, sediment discontinuity, pesticides and herbicides.

3.3 MAINTENANCE CONCERNS

District's current routine maintenance regime for the project site is limited due to constrained site access. Routine maintenance within the project reach is comprised of vegetation removal for capacity at bridges, removal of instream exotic vegetation, road/ramp repairs and fence repair. The creek has poor access for trash and debris removal therefore those activities are limited to areas where access if afforded.

The proposed project would increase maintenance activities within the project reach. Floodwalls require routine maintenance which includes inspection for structural integrity, graffiti removal and repairs if required. Levees require increased routine maintenance which includes, mowing and vegetation management (i.e. pre and post herbicide application) on slopes and road surface, slope and surface repairs (i.e. regrading) rodent control and annual inspection. Increased access to the creek however, would facilitate trash and debris removal for the creek and riparian areas.

3.4 EROSION AND SEDIMENTATION PROBLEMS

This project has considered physical channel functions and processes to design a project that is stable with respect to fluvial geomorphic principles (Natural Flood Protection Objective 3) to improve instream complexity (Project Objective 2) and minimize the need for future operations and maintenance activities within the completed project limits (Project Objective 5). Field reconnaissance has been conducted to collect sediment samples and basic geomorphic data which has supported sediment transport modeling and a geomorphic assessment of the project reach respectively.

Based on field investigations and the 1970 and 2003 cross section comparisons, a sediment study report within the project area has been prepared (SCVWD, 2007). The report suggested that the existing channel configuration is relatively stable. However, modification of the existing channel geometry to increase flow conveyance could induce degradation or aggradation at locations within or beyond the project limits. Therefore, a further survey and monitoring have been planned by District.

3.5 ENVIRONMENTAL RESOURCE PROBLEMS

Hazardous Materials

The project will include construction activities related to channel modifications within the project reach at various locations. Project construction is expected to include levee construction, channel widening, and river benches in areas that are industrial and commercial with the potential for contamination. Preliminary investigations have been conducted to evaluate the potential for and identify known hazardous materials sites occurring near the project reach (see Section 2.16). Additional representative sampling of creek sediments, groundwater, and bank soils including east channel slopes is recommended to determine the potential for contamination in excavated materials that would require special handling and disposal during the design phase. The sampling should include soil borings (depth and location to be determined by a geotechnical engineer) and laboratory analysis to determine the occurrence of petroleum hydrocarbons, metals, pesticides, polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), etc.

Wildlife Habitat

Undisturbed riparian habitats are considered to be among the most important and productive habitats for wildlife in California. The availability of water, diversity and abundance of plant life, and complex vegetation structure all provide a variety of wildlife species with food, cover, breeding, and resting sites (Stiling, 1999). Grazing, agriculture, urban encroachment and dams have drastically reduced or altered the natural habitats surrounding Coyote Creek. The absence of the appropriate adjacent habitats can reduce wildlife values by decreasing key dispersal and foraging areas for wildlife species. The riparian corridor has become narrow and discontinuous as a result of adjacent land use and habitat disturbance (HRG, 1995).

Nonnative vegetation occurs throughout the project reaches, although the dominant species and distribution varies from reach to reach. The potential effects of these nonnative species on wildlife values also vary. In circumstances where nonnative vegetation is distributed in relatively small areas within native vegetation, detrimental effects can be minimal. Even in cases of widespread infestations, adverse effects can be limited if the nonnative species is similar in structure to native species and is part of a diverse vegetative community. However, widespread infestations of nonnative species that result in a reduction in the number and structural diversity of plant species can be very detrimental to wildlife habitat values.

Disturbance levels for adjacent land uses are another source of adverse effect to wildlife habitat quality along Coyote Creek within the project reach. Disturbance levels are relatively high throughout the project area, with commercial and industrial land uses are prominent from Montague to Interstate 880. The presence of homeless people is also a prominent feature in the project area. Homeless encampments generate trash, debris, human waste and can cause significant alterations to the riparian corridor. A more indirect but significant effect of human activity throughout the project area is the substantial and widespread distribution of feral cats. The feral cat population along this and other urban creeks can have a drastic effect on bird and small mammal populations.

Although the riparian corridor has been significantly impacted, Coyote Creek does provide important habitat for a variety of wildlife species. Trees that are present in the corridor and considered important for wildlife use include: cottonwood (*Populus sp*.), western sycamore (*Platanus sp*.), box elder (*Acer sp*.), elderberry (*Sambucus sp*.), and willows (*Salix sp*.). Important cover, nest and roost sites for landbirds are provided by large canopy trees as well as the dense mid-canopy growths of willows. Important sources of food for birds and mammals in the project area include: elderberry, blackberry (*Rubus sp*.) and poison oak (*Toxicodendron sp*.), as well as deciduous trees that support large populations of insects for insectivorous wildlife species (HRG, 1989, 1995).

Impacts associated with urban environments that effect the wildlife in Coyote Creek are numerous and complex. The effect that one activity may have on wildlife quality and quantity would be difficult to isolate. Activities such as flood control, industrial noise, road crossings, introduced plant and animal species, human encampments in the riparian corridor and development in the floodplain all have pronounced cumulative effects on wildlife in the project area.

Aquatic Habitat

The District has habitat typed and sampled fish populations from Montague Expressway to Interstate 280. The results of that sampling effort have documented baseline conditions for native fish in the highly urbanized portion of the creek. Aquatic habitat in the reach from Montague expressway to I-880 is predominately comprised of deep, mid-channel pools which support very few native fish. The lack of instream complexity (i.e., large woody debris) coupled with the homogenized habitat, poor sediment quantity/quality, and degraded water quality is believed to be the factors which have contributed to the decline of native fish assemblages in the project area.

Additionally, the temperature of water in the project reach is high despite the fact that the area is densely shaded. Light, like temperature, is a critical variable in most ecosystems. In streams, solar radiation is necessary for photosynthesis by attached algae. One notable side effect of the upstream reservoirs and intense urbanization for vegetation types on the valley floor is the change in duration, magnitude, frequency, and timing of flood flows. The scouring of floodplain soils rejuvenates habitat for plant species that only germinate on barren wetted surfaces free of completion. Vegetation types in Coyote Creek have converted from Sycamore Alluvial Woodland to a dense Willow-Cottonwood plant assemblage. This has created a dense canopy of trees adjacent to the wetted perimeter where sunlight cannot penetrate to the water surface. Algae production is limited due to the dense shading and turbid water found within the project reach. This longitudinal downstream change in light regime from historic conditions affects stream bioenergetics and fish populations in the project reach.

CHAPTER 4: INTEGRATED WATER RESOURCES MANAGEMENT PROGRAMS

In addition to conformance with the relevant District policies identified in Chapter 1, the San Jose General Plan 2020 contains relevant goals and policies in the following fields:

- Level of Service
- Parks and Recreation
- Trails and Pathways
- Riparian Corridors and Upland Wetlands
- Species of Concern
- Urban Forest
- Water Resources
- Soils and Geologic Conditions
- Flooding

It is the District's practice to work with the local jurisdiction during project planning and to conform to local land use plans and policies to the extent possible.

The project will also require permits and consultation from regulatory agencies. The California Environmental Quality Act (CEQA) review process will provide both trustee and responsible agencies with an opportunity to provide input into the project. Trustee agencies are state agencies that have authority by law for the protection of natural resources held in trust for the public. Responsible agencies are those that have some responsibility or authority for carrying out or approving a project; in many instances these public agencies must make a discretionary decision to issue a local permit; provide right-of-way, funding or resources that are critical to the project's proceeding. In this instance the City of San Jose, U.S. Fish and Wildlife Service, National Oceanographic and Atmospheric Administration's National Marine Fisheries Service, U.S. Army Corps of Engineers, and the San Francisco Bay Regional Water Quality Control Board are considered responsible agencies. The California Department of Fish and Game is considered both a responsible agency and a trustee agency. The District will work with responsible and trustee agencies to ensure that the proposed project meets applicable policies and requirements.

To assist federal, state, and local agencies to carry out their responsibilities for permit review or approval authority over various aspects of the project, District, acting as the CEQA lead agency, will prepare environmental documentation, as appropriate. The project would likely require project-specific permitting and/or review as summarized in Table 4-1 below.

TABLE 4-1
Summary of Agency Approvals

Agency	Permit/Review Required
National Marine Fisheries Service	Federal Endangered Species Act (16 USC 1531 et seq.) Section 7
U.S. Fish and Wildlife Service	Fish and Wildlife Coordination Act (16 USC 661 et seq.) Migratory Bird Treaty Act (16 USC 703-712)
U.S. Army Corps of Engineers	Clean Water Act (CWA) (33 USC 1251 et seq.) §404 National Historic Preservation Act (16 USC 470 et seq.) Section 106 National Environmental Policy Act (42 USC 4321 et seq.)
California Department of Fish and Game	California Fish and Game Code (F&G Code) §1602, Streambed Alteration Agreement California Endangered Species Act (F&G Code §2050 et seq.) California Natural Communities Conservation Planning Act (F&G Code §2800 et seq.) California Native Plant Protection Act (F&G Code §1900 et seq.) F&G Code §§3503, 3503.5, 3511, 3513, 3515, 3800, and 4700
San Francisco Bay Regional Water Quality Control Board	CWA §303(d) Total Maximum Daily Load Program CWA §401 Water Quality Certification or Waste Discharge Requirement CWA §402(p) Municipal Regional Stormwater National Pollutant Discharge Elimination System Permit and General Permit for Construction Activities California Porter-Cologne Water Quality Act (California Water Code §13000 et seq.)
City of San Jose	Municipal approvals and permits, as needed
Santa Clara Valley Water District	CEQA (California Public Resources Code §21000 et seq.) lead agency Water Resources Protection Ordinance (06-1) Santa Clara Valley Habitat Conservation Plan/Natural Community Conservation Plan, as applicable

CHAPTER 5: PROJECT ELEMENTS

The intent of this chapter is to present the alternatives considered for the Project and to evaluate each alternative based on project specific objectives, NFP objectives, and cost associated with construction and real estate acquisition. The end result of this analysis is to recommend a project which will be further developed, designed, and constructed.

5.1 ALTERNATIVE APPROACH

Each of the alternatives considered includes an engineering solution to the primary flooding objective and also incorporates means to meet water quality, habitat, and maintenance objectives. Engineering solutions include: channel widening, floodwalls, and levees.

In addition, the alternatives were developed with sufficient detail to determine approximate real estate acquisition and construction costs. The alternatives then were evaluated based on how well they met the project and NFP objectives.

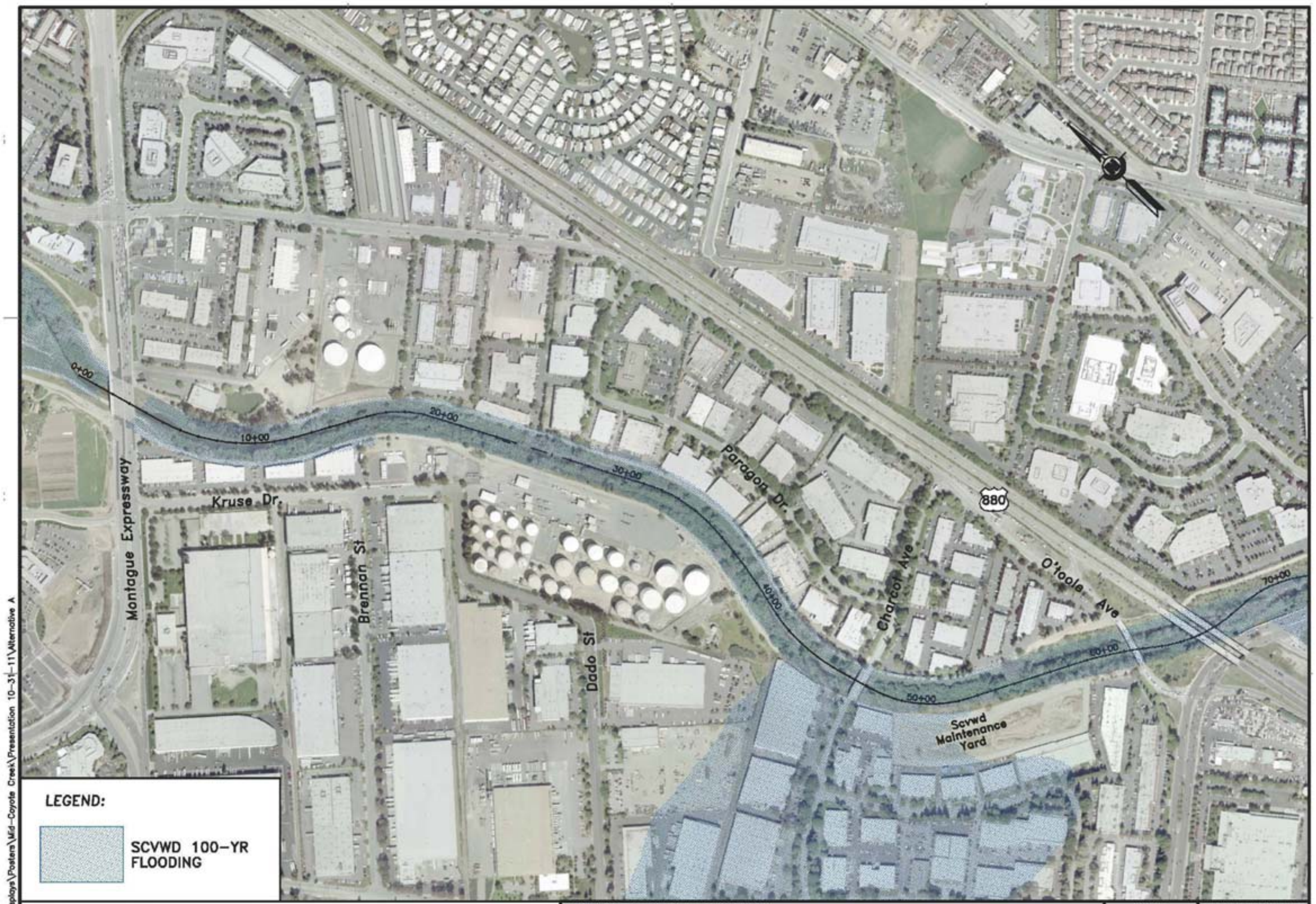
5.2 FORMULATION OF ALTERNATIVES AND THEIR SIGNIFICANT IMPACTS

A description of each of the alternatives includes the project footprint, cost for construction and real estate acquisition, benefits, and ability to meet project objectives follows.

5.2.1 Alternative A (No Project)

A. Alternative Description

Under Alternative A (no project), no improvement would be implemented in the project area. Flood flows would continue to overtop channel banks and inundate adjacent properties, resulting in flood-related damages to residences, roadways, and businesses (see Figure. Alt. A).



Santa Clara Valley Water District

PROJECT NAME AND SHEET DESCRIPTION:

COYOTE CREEK
MONTAGUE EXPRESSWAY TO I-880

EXISTING CONDITIONS
ALTERNATIVE A

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PROJECT NUMBER
26174043

FIGURE
ALT-A

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B. Project Objectives

This alternative would not meet all of the project objectives. A summary of the alternative's effectiveness to meet project objectives follows.

Objective 1: Provide Flood Protection

Businesses and private properties located within existing 1 percent flood areas would remain at flood risk and continue to pay flood insurance premiums. The existing levees would be severely overtopped and potentially damaged during the flooding.

Objective 2: Improve Instream Complexity

This objective wouldn't be met, since there would not have any new measures in the creek to improve the instream complexity.

Objective 3: Improve Water Quality

Water quality conditions would not be improved and would likely degrade over the time due to channel erosion and continued trash accumulation throughout the project reach. Water quality would continue to be a concern for residents.

Objective 4: Support Additional Trails and Public Recreation

No opportunities for new public trails or creek access would be provided.

Objective 5: Minimize the Need for Future Operation and Maintenance Activities and Create a Self-Sustaining System

Current operation and maintenance practices would continue where the District holds right-of-way or ownership rights.

Objective 6: Obtain Community Support

Current cooperation with local public agencies and interest groups to remove trash and debris and to develop pubic trails would continue.

C. Real Estate Needs

No real estate issues are expected; however, the District would continue to consider acquisition of creek side parcels that become available.

D. Cost Estimate

Capital costs would be $0.

Maintenance cost would continue, estimated to be $100,000 annually.

E. Technical Feasibility

No issues are expected.

5.2.2 Alternative B

A. Alternative Description

This alternative would increase creek capacity to accommodate the 100-year design flow through the channel widening.

Improvements to these reaches would include approximately a 150–foot wide excavated floodplain bench that alternates between the east and west sides of the stream channel. Additionally, floodwalls (1-6 feet high) would be installed at the outer limit of the maintenance roads in reaches. Excavation of the floodplain bench would require real estate acquisition beyond the existing right of way limit.

The channel widening would consist of excavating the upper slopes of the existing creek banks to create floodplain benches. The benches will be designed to ensure sediment transport continuity within the low flow channel and to reduce shear stress at locations where high velocities are expected during flood flows which could lead to erosive conditions. Field investigations indicate that the floodplain bench would be situated at the bankfull discharge elevation located approximately 4 feet higher than the creek bottom. Figure 5-1 illustrates a typical cross section for this alternative.

Existing creek-side vegetation would be removed during the creek widening, and newly formed benches would be replanted with native vegetations.

A continuous 20' wide maintenance road would be located along the new top of bank (both sides) at the limits of the channel excavation (see Figure Alt. B).

The existing bridge at Charcot Avenue would be replaced to meet freeboard requirements for the design flow and to accommodate a widened floodplain bench.

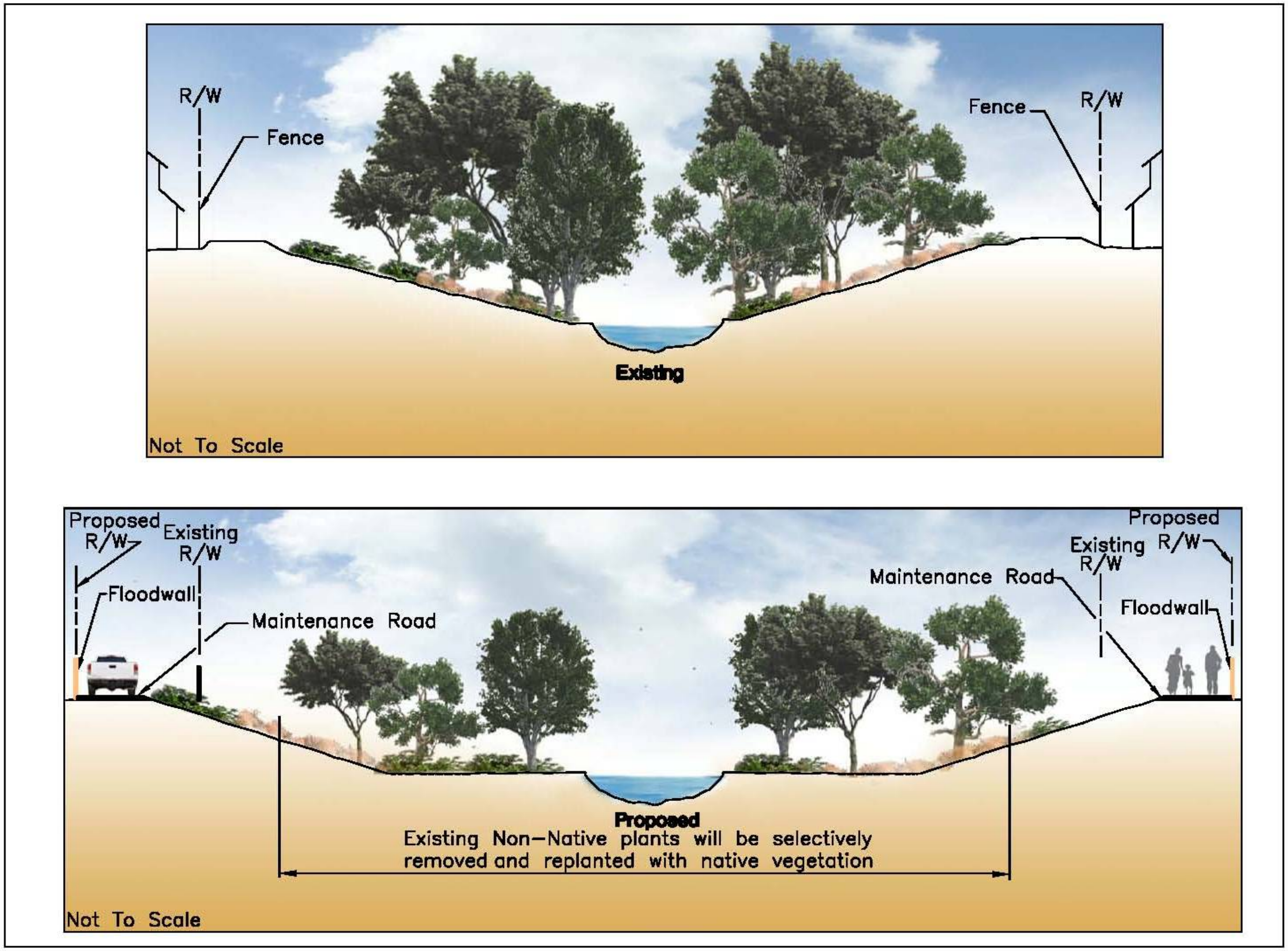
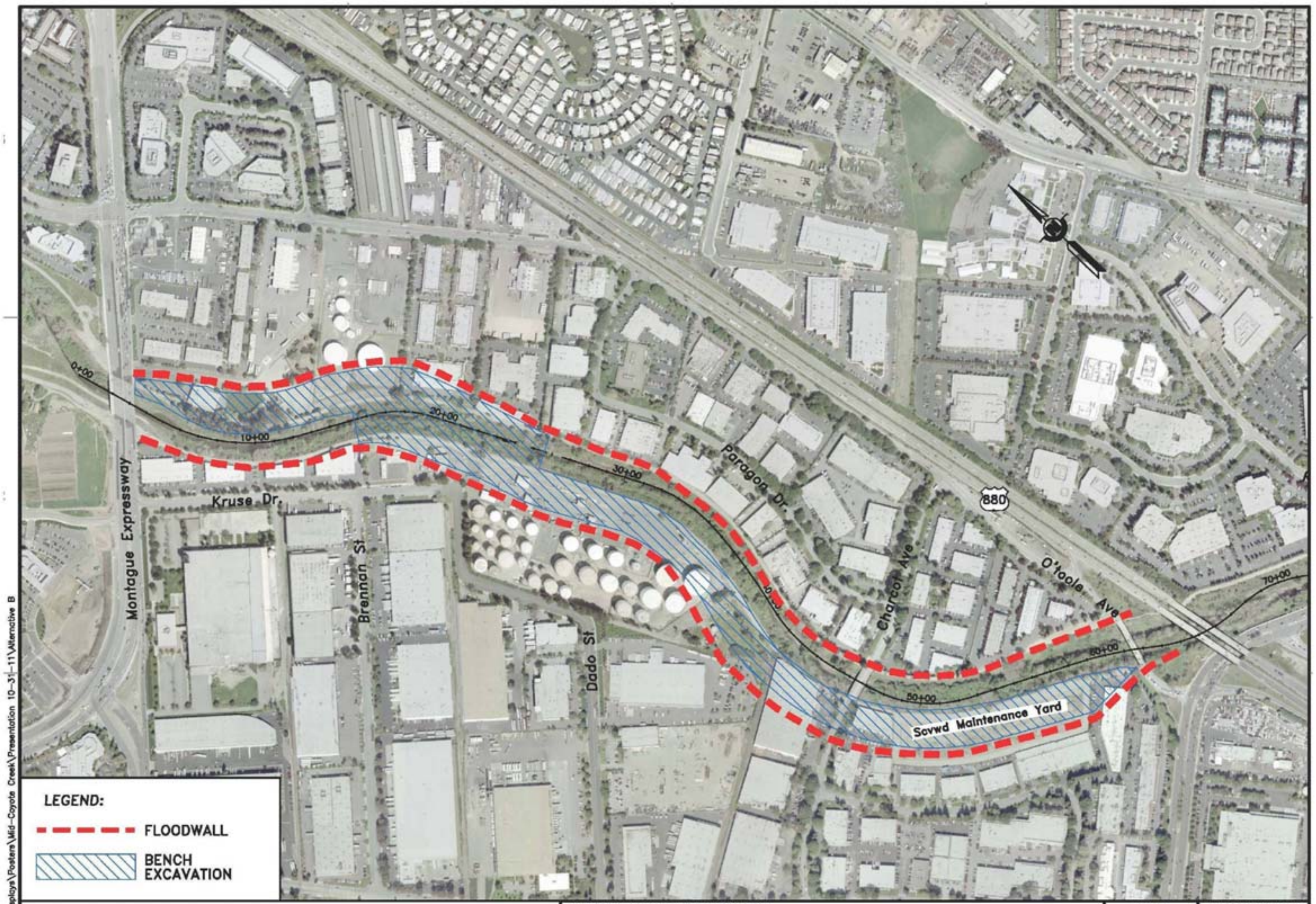


FIGURE 5-1 (Alt. B)
Looking Downstream



Santa Clara Valley Water District

PROJECT NAME AND SHEET DESCRIPTION:

COYOTE CREEK
MONTAGUE EXPRESSWAY TO I-880

ALTERNATIVE B

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PROJECT NUMBER
26174043

FIGURE
ALT-B

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B. Project Objectives

A summary of the alternative's effectiveness to meet project objectives follows.

Objective 1: Provide Flood Protection

This alternative would meet the objective of providing flood protection by widening the creek and installing flood walls/levees to increase channel capacity for the design flow. The hydraulic modeling indicates that the improved channel would have sufficient capacity for the design flow and would meet freeboard requirements.

Objective 2: Improve Instream Complexity

This alternative would provide opportunities to improve instream complexity by widening the creek, using bio-engineering measures in the creek, and removing the dense vegetation on banks to allow sunlight to penetrate to the water surface. The removal of the vegetation for creation of the floodplain benches would improve the light penetration to the heavily shaded corridor. Solar radiation is necessary for photosynthesis by attached algae and is an integral part of stream ecosystem function.

This alternative would improve the quality and quantity of habitat compared to existing conditions as well as improved connectivity with the newly created flood benches. Sediment transport through the site could be improved by properly sizing the low flow channel with this alternative.

Objective 3: Improve Water Quality

This alternative may provide an opportunity to marginally improve water quality by increasing the sediment transport capacity through changes in the current channel geometry. The enlarged channel would allow for accretion of sediment which has the potential to change pool-riffle sequence which may overall improve water quality.

Opportunities to improve water quality may also occur through coordination with the City of San Jose to improve modification of the cities drainage outfalls to help control non-point source pollutants and trash entering the waterway.

Improved access to the creek through the addition of maintenance roads, would allow the District to better address trash and debris issues within the creek corridor.

Objective 4: Support Additional Trails and Public Recreation

This alternative would create opportunities to provide public recreation and access by incorporating new maintenance roads and CSJ's Master Trail Plan in the study.

Objective 5: Minimize the Need for Future Operation and Maintenance Activities and Create a Self-Sustaining System

This alternative would not minimize the need for future operation and maintenance activities. The new facilities described in this alternative would increase the annual operations and maintenance costs compared to the existing conditions because of the additional right of way and maintenance requirements of the constructed improvements. The addition of maintenance roads/trails, levees, floodwalls and flood benches would require routine maintenance such as herbicide application, trimming and vegetation removal, invasive plant species removal and animal control, levee/bank/channel repairs, removing sediment, and graffiti removal.

For this alternative, it is anticipated with increased public access and maintenance roads that the District's cost for trash and debris removal would also increase due to greater public awareness of trash and debris within the channel. Coordination with the City of San Jose on redesigning the drainage networks to Coyote Creek may alleviate some costs for trash removal in the creeks if the drainage networks are outfitted with debris collection devices. Additionally, opening up the creek corridor through creation of flood benches may decrease the number of homeless encampments that are currently found within the project limits.

However, it is also expected that the multi-staged channel in this alternative would allow for natural river processes to transport sediment and scour vegetation from the low flow channel, effectively reducing the amount of sediment removal and vegetation management activities required to maintain the channel to design capacity.

Objective 6: Obtain Community Support

This flood protection project is funded for planning, design and partial construction under the Clean, Safe Creek program. Many outreach activities have conducted during the project development and no objection to this alternative has been received.

C. Real Estate Needs

This alternative includes significant real estate acquisition. The District owns 220 feet of right-of-way in the project reach. As a result, a majority of the improvements presented under this alternative would require additional land acquisition. Preliminary estimates indicate that roughly 23 acres of adjacent creek side land would be needed.

If a decision is made to pursue this alternative, the feasibility of obtaining adjacent right-of-way and appropriate mitigation will have to be assessed.

D. Cost Estimate

The preliminary capital cost estimate for this alternative is about $51 million.

E. Technical Feasibility

This alternative is technically feasible.

F. Additional Project Considerations

Floodplain bench excavation activity along the project area is likely to intersect potential hazardous soils near the gas tank site based on our preliminary HAZMAT study.

This alternative would remove existing riparian vegetation and further confine and isolate the stream course by levee and floodwall construction.

The construction would require acquisition of adjacent business property and therefore would impact the business operation. The mitigation would need to be provided.

It may be possible to remove the Charcot Road Bridge and not be replaced by rerouting traffic to adjacent existing roads to handle changes in local traffic patterns. A traffic study would need to be performed and approved by City of San Jose. Replacement of the bridge may be eligible for cost sharing with City of San Jose.

G. Opportunities and Constraints

This alternative would provide flexibility to accommodate habitat enhancements features in the future. Such enhancements could include gravel augmentation, fish habitat, geomorphic improvements and addressing other biological or water quality concerns in the project area.

This project is covered under the Santa Clara County Valley Habitat Plan, therefore, the approval process for obtaining permits from regulatory agencies could be streamlined through the process which is currently in the planning phase. Additional regulatory permits will be required from the Regional Water Quality Control Board, the California Department of Fish & Game, and from the U.S. Army Corps of Engineers with consultation by the USFWS and NOAA Fisheries.

5.2.3 Alternative C

A. Alternative Description

This alternative includes floodwall construction to increase the creek capacity for the design flow. Existing non-native vegetation would be selectively removed during the project implementation (see Figure Alt. C).

In the project reach, 1 to 7.5 ft. high floodwalls would be installed at back of the existing levees which are the limits of District's right-of-way, to increase the creek capacity to carry the design flow and provide sufficient freeboard. A continuous 20-ft. wide maintenance road would be constructed at the inboard side of the floodwalls. The geometry of the channel would not be modified. Figure 5-2 is a typical cross section for this reach.

Charcot Ave Bridge would be replaced to provide conveyance with a required freeboard and to accommodate the construction of floodwalls. A cost-share agreement on the bridge replacement would be coordinated with the City of San Jose.

B. Project Objectives

A summary of the alternative's effectiveness to meet project objectives follows.

Objective 1: *Provide Flood Protection*

This alternative would meet the objective of providing flood protection by installing flood walls to increase channel capacity for the design flow. The hydraulic modeling indicates that the improved channel would have sufficient capacity for the flow and meet freeboard requirements.

Objective 2: *Improve Instream Complexity*

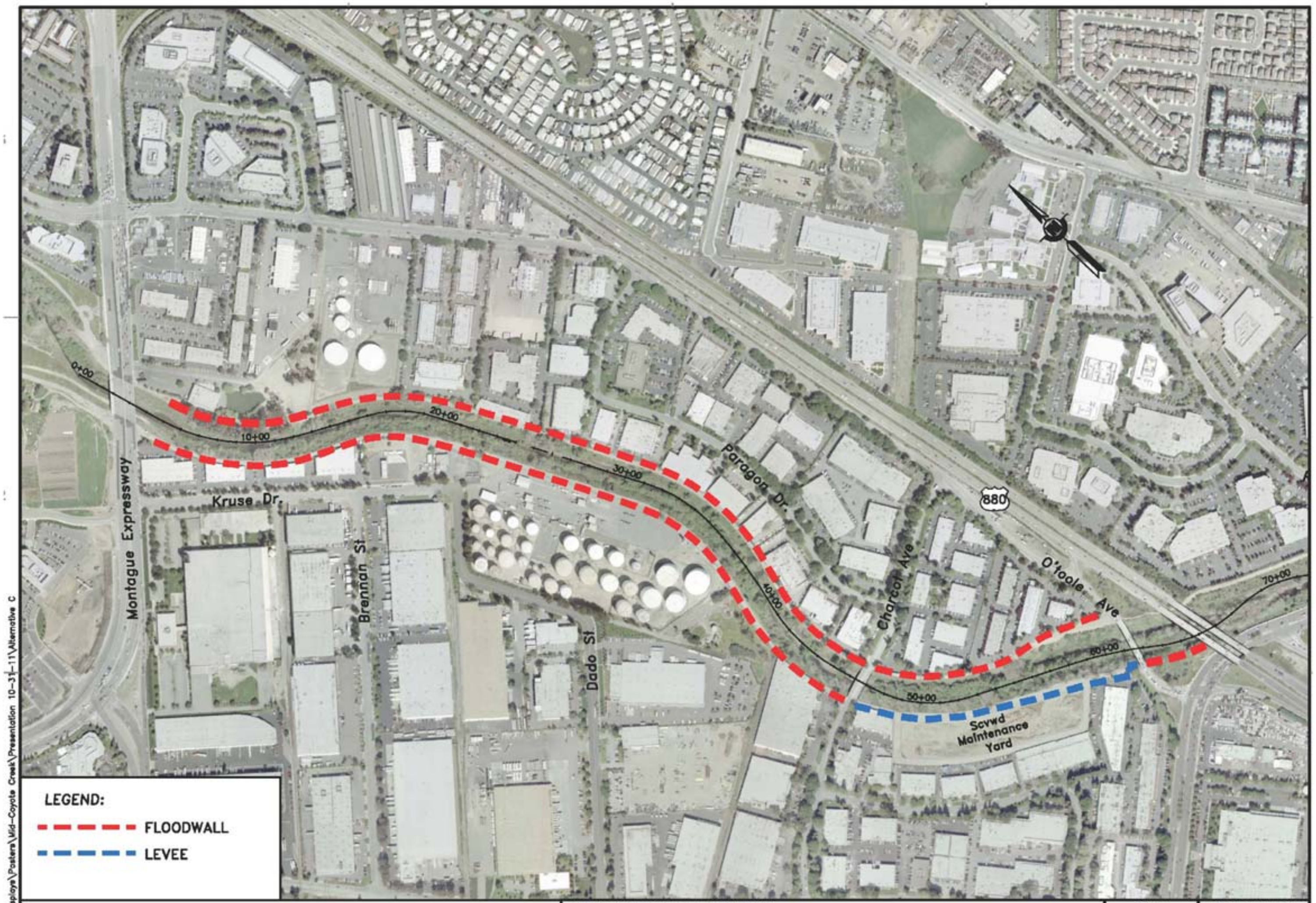
This alternative could improve instream complexity to enhance riparian function by using bio-engineering measures, removing exotic/ invasive vegetation, and replacing with Sycamore Alluvial Woodland plant palates.

Objective 3: *Improve Water Quality*

This alternative would not change the channel geometry, therefore, the water quality due the sediment transportation would not be improved; however, improved access to the creek through the addition of maintenance roads, would allow the District to better address trash and debris issues within the creek corridor..

Objective 4: *Support Additional Trails and Public Recreation*

This alternative would provide opportunities for public recreation and access by incorporating new maintenance roads and CSJ's Master Trail Plan in the study.



Santa Clara Valley Water District

PROJECT NAME AND SHEET DESCRIPTION:

COYOTE CREEK
MONTAGUE EXPRESSWAY TO I-880

ALTERNATIVE C

SCALE	PROJECT NUMBER
NOT TO SCALE	26174043
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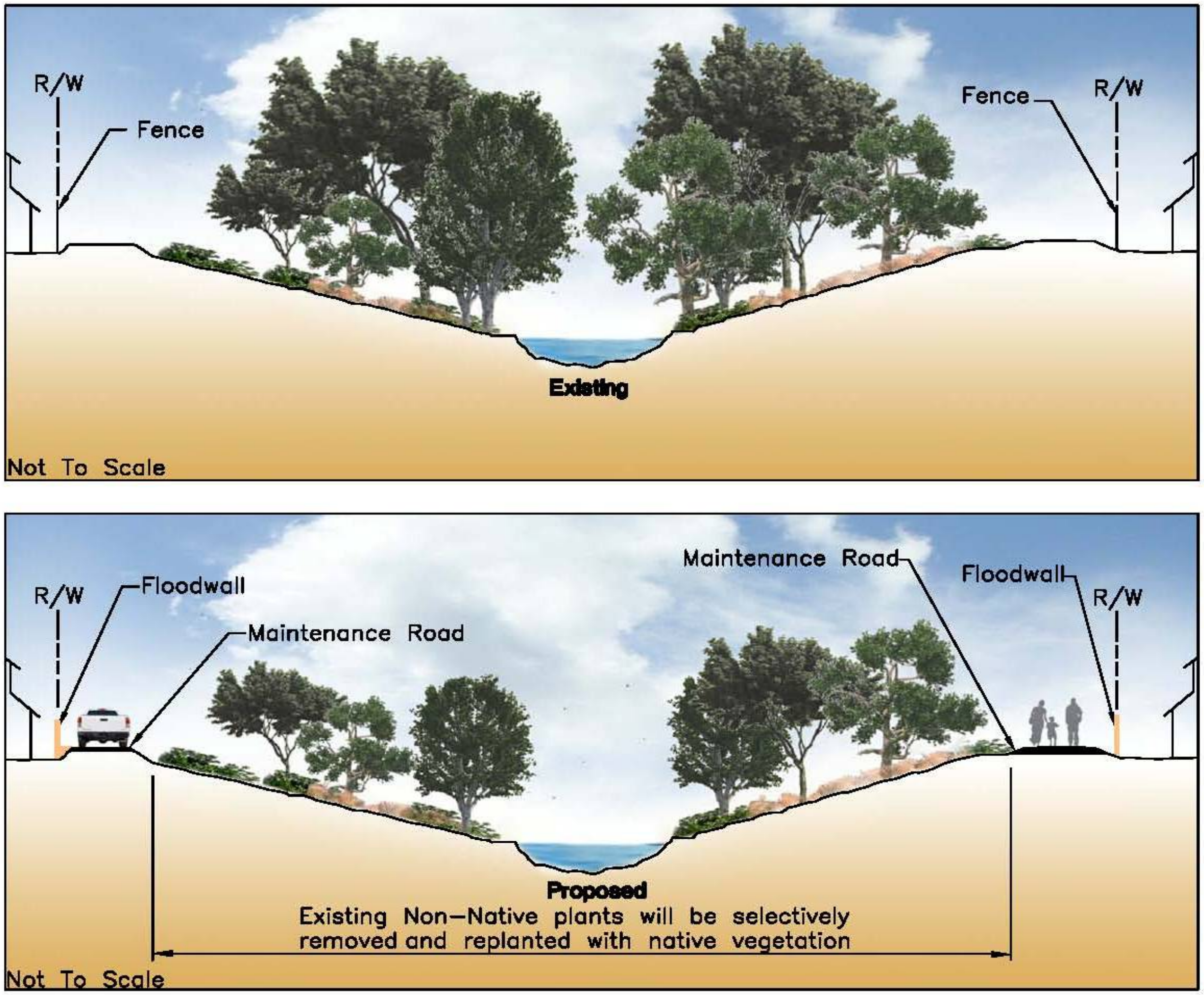


FIGURE 5-2 (Alt. C)
Looking Downstream

Objective 5: Minimize the Need for Future Operation and Maintenance Activities and Create a Self-Sustaining System

In this alternative, current operation and maintenance practices would be expanded to include the new facilities provided by this alternative. The new facilities described in this alternative would increase the annual operations and maintenance costs compared to the existing conditions because the addition of maintenance roads/trails and floodwalls would require routine maintenance such as herbicide application, trimming and vegetation removal, invasive plant species removal and animal control, channel bank repairs, removing sediment, and graffiti removal.

For this alternative, it is anticipated with increased public access and maintenance roads that the District's cost for trash and debris removal would also increase due to greater public awareness of trash and debris within the channel. Coordination with the City of San Jose on redesigning the drainage networks to Coyote Creek may alleviate some costs for trash removal in the creeks if the drainage networks are outfitted with debris collection devices.

Objective 6: Obtain Community Support

This flood protection project is funded for design and partial construction under the Clean, Safe Creek Program to design a project that would provide environmental quality, community benefit and protection from creek flooding in a cost effective manner. A series of homeowner association meetings and public meeting have been held and no objection to this alternative has been received.

C. Real Estate Needs

The improvements from Montague Expressway to O'Toole would be performed within the existing SCVWD right-of-way; therefore, there is no need to acquire additional real estate. The 5-foot floodwall construction from O'Toole to I-880 would need 0.5 ac of easement from the State of California.

D. Cost Estimate

The preliminary capital cost estimate for this alternative is approximately $22.5 million.

E. Technical Feasibility

This alternative is technically feasible.

F. Additional Project Considerations

Floodwall construction activity along the project area is likely to intersect potential hazardous soils near the oil tank storage area based on our preliminary HAZMAT study.

It may be possible to remove the Charcot Road Bridge and not be replaced by rerouting traffic to adjacent existing roads to handle changes in local traffic patterns. A traffic study would need to be performed and approved by City of San Jose. Replacement of the bridge may be eligible for cost sharing with City of San Jose.

This alternative would include removal of existing riparian vegetation for construction of maintenance roads and floodwalls. Additionally, the creek will be isolated from any adjacent upland habitat with the construction of floodwalls.

5.2.4 Alternative D

A. Alternative Description

Between Montague Expressway and O'Toole Bridge, the east bank would be excavated to lower the existing levee by 5 feet (see Figure Alt. D). The creek would be widened by about 10 feet and the water surface would be lowered further by about 0.5 – 1.5 feet, compared to Alt. C, within 1000 feet upstream of Montague Expressway bridge. The required floodwall heights would vary from 2 to 6 feet on west bank and 7 to 11 feet on east bank.

At upstream of O'Toole, a 5-foot high flood wall would be constructed to protect the State Corp yard from flooding.

Charcot Avenue Bridge would be replaced and raised by 6 feet to provide conveyance with a required free board and to accommodate the construction of floodwalls. A cost-share agreement on the bridge replacement would be coordinated with the City of San Jose.

A continuous 20-ft-wide maintenance road would be constructed at the inboard side of the floodwalls. The existing vegetations on east side of existing floodplain would be removed and replanted after the improvements. Figure 5-3 is a typical cross section for this reach.

B. Project Objectives

A summary of the alternative's effectiveness to meet project objectives follows.

Objective 1: *Provide 1 Percent Flood Protection*

This alternative would meet the objective of providing flood protection by installing flood walls to increase channel capacity for the design flow. The hydraulic modeling indicates that the improved channel would have sufficient capacity for the flow and meet freeboard requirements.

Objective 2: *Improve Instream Complexity*

This alternative would provide opportunities to enhance ecological stream functions by widening the creek, adding instream complexity and removing the dense vegetation on banks to allow sunlight to penetrate to the water surface.

The removal of the vegetation for creation of the floodplain benches would improve the light penetration to the heavily shaded corridor. Solar radiation is necessary for photosynthesis by attached algae and is an integral part of stream ecosystem function.

This alternative would improve the quality and quantity of habitat compared to existing conditions as well as improves connectivity with the newly created flood benches. Sediment transport through the site could be improved by properly sizing the low flow channel with this alternative

Objective 3: Improve Water Quality

This alternative may provide an opportunity to marginally improve water quality by increasing the sediment transport capacity through changes in the current channel geometry. The enlarged channel would allow for accretion of sediment which has the potential to change pool-riffle sequence which may overall improve water quality.

Opportunities to improve water quality may also occur through coordination with the City of San Jose to improve modification of the cities drainage outfalls to help control non-point source pollutants and trash entering the waterway.

Improved access to the creek through the addition of maintenance roads, would allow the District to better address trash and debris issues within the creek corridor.

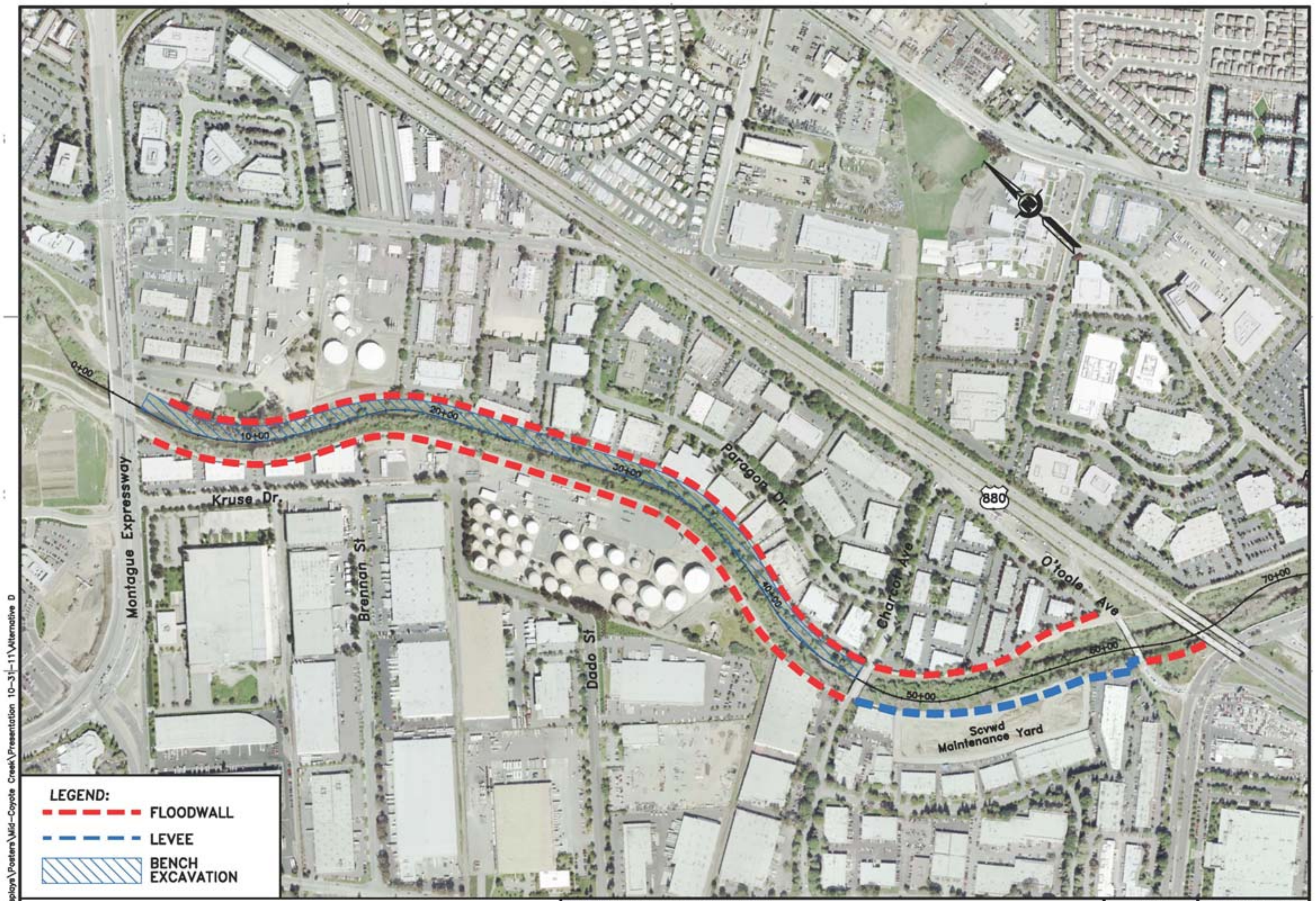
Objective 4: Support Additional Trails and Public Recreation

This alternative would provide opportunities for public recreation and access by incorporating new maintenance roads and CSJ's Master Trail Plan in the study.

Objective 5: Minimize the Need for Future Operation and Maintenance Activities and Create a Self-Sustaining System

Current operation and maintenance practices would be expanded to include the new facilities provided by this alternative. Typical maintenance activities will include vegetation (overgrowth) removal, erosion repair in creek, sediment removal, trash and debris removal, and graffiti removal. The new maintenance road/trails will give the District staff accesses to the creek and provide services to the community.

The new facilities described in this alternative would increase the annual operations and maintenance costs compared to the existing conditions because the addition of maintenance roads/trails and floodwalls would require routine maintenance such as herbicide application, trimming and vegetation removal, invasive plant species removal and animal control, channel bank repairs, removing sediment, and graffiti removal.



Santa Clara Valley Water District

PROJECT NAME AND SHEET DESCRIPTION:

COYOTE CREEK
MONTAGUE EXPRESSWAY TO I-880

ALTERNATIVE D

SCALE	PROJECT NUMBER
NOT TO SCALE	26174043
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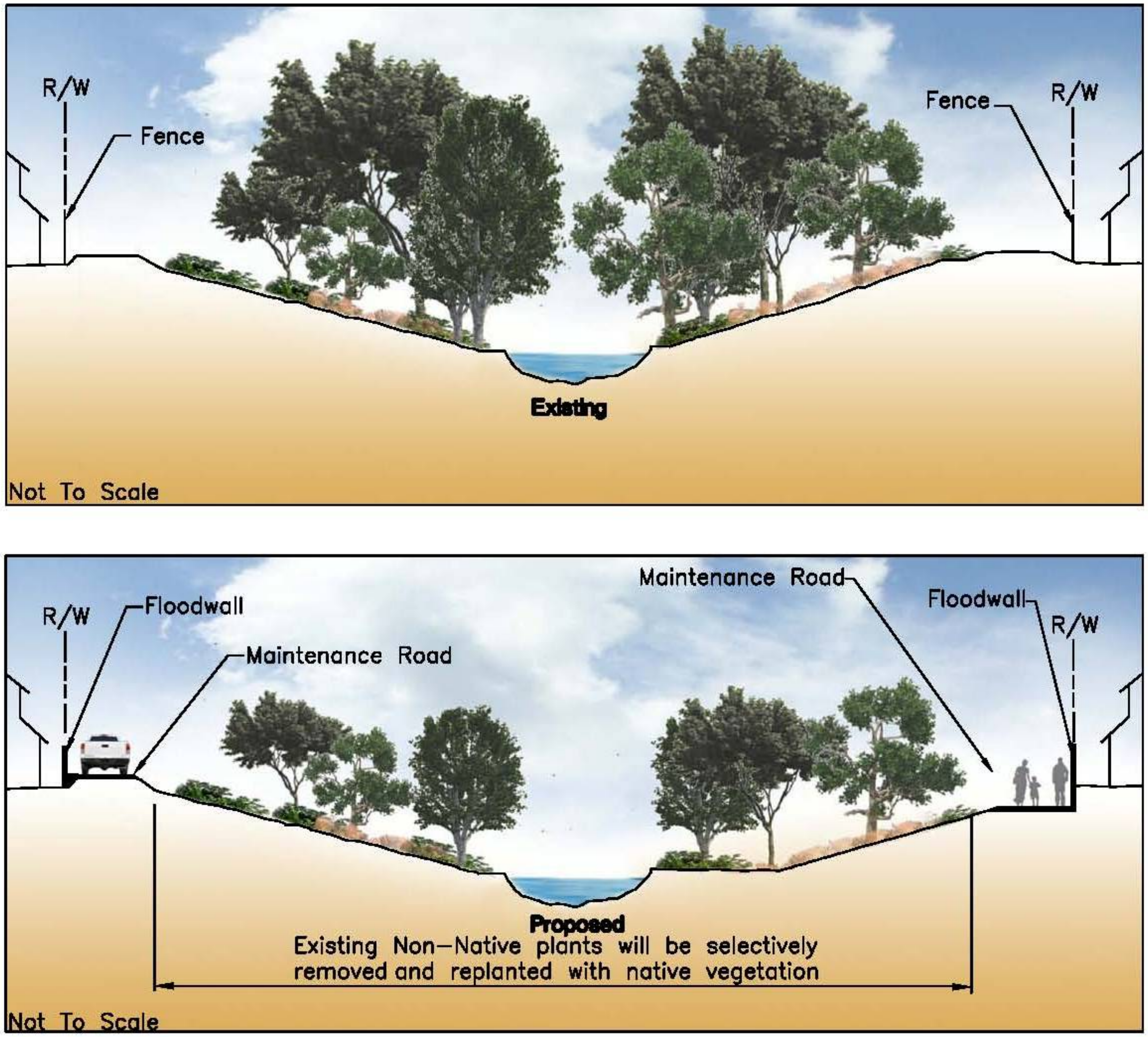

FIGURE 5-3 (Alt. D)
Looking Downstream

For this alternative, it is anticipated with increased public access and maintenance roads that the District's cost for trash and debris removal would also increase due to greater public awareness of trash and debris within the channel. Coordination with the City of San Jose on redesigning the drainage networks to Coyote Creek may alleviate some costs for trash removal in the creeks if the drainage networks are outfitted with debris collection devices.

Objective 6: Obtain Community Support

This project is funded for design and partial construction under the Clean, Safe Creek Program to design a project that would provide environmental quality, community benefit and protection from creek flooding in a cost effective manner. A series of homeowner association meetings and public meeting have been held and no objection to this alternative has been received.

C. Real Estate Needs

The improvements from Montague Expressway to O'Toole would be performed within the existing SCVWD right-of-way; therefore, there is no need to acquire additional real estate. The 5-foot floodwall construction from O'Toole to I-880 would need 0.5 ac of easement from the State of California.

D. Cost Estimate

The preliminary capital cost estimate for this alternative is approximately $27 million.

E. Technical Feasibility

This alternative is technically feasible.

F. Additional Project Considerations

Floodwall construction activity along the project area is likely to intersect hazardous soils based on our preliminary HAZMAT study.

It may be possible to remove the Charcot Road Bridge and not be replaced by rerouting traffic to adjacent existing roads to handle changes in local traffic patterns. A traffic study would need to be performed and approved by City of San Jose. Replacement of the bridge may be eligible for cost sharing with City of San Jose.

This alternative would include removal of existing riparian vegetation and isolation of the creek corridor from upland habitats by the construction of floodwalls.

5.3 COMMUNITY INVOLVEMENT

Throughout the planning process, outreach activities have been performed to inform the public, local groups, city and county, and resources agencies of project progress and solicit feedback. The interests of customers, partners and stakeholders in solving the problem(s) or supporting enhancement opportunities are essential elements of our project formulation.

5.3.1 Home Owner Association Meetings

These groups represent residents and organizations directly impacted by our project. Their concerns and input to our proposed alternatives will affect our decisions. To give residents more time to understand the project process, the project team attended a series of Home Owner Association Meetings to review flood protection tools that have been used in the project to address the problems found by the District.

In the meetings, residents indicated their growing concerns about the creek maintenance, accessible trails, and creek water quality.

- November 15, 2007: first time to attend Roosevelt Park Neighborhood Association Meeting;
- November 15, 2007: first time to attend Northside Neighborhood Association meeting;
- January 17, 2008: second time to attend Northside Neighborhood Association meeting;
- February 6, 2008: first time to attend Olinder Neighborhood Association meeting;
- February 13, 2008: second time to attend Roosevelt Park Neighborhood Association meeting;
- February 20, 2008: attended Autumn Terrace at William Owner’s Association meeting;
- April 16, 2008: first time to attend Naglee Park Neighborhood Association meeting;
- November 5, 2008: attended Olinder and Roosevelt Park Neighborhood Association meeting;
- November 12, 2008: second time to attend Naglee Park Neighborhood Association meeting;
- February 24, 2009: attended the City of San Jose District 3 Neighborhood Advisory Group meeting with the City Councilmember Sam Liccardo.

5.3.2 Public Meetings

Public meetings were held at all project milestones. The team needs public input to better understand the problems and issues and incorporates them with other factors such as economics, engineering feasibility and environmental concerns to formulate the desired plan. All Residents and businesses within 500-1000 linear feet of the creek were invited to the meetings.

- *Problem Definition for project area from Montague Expressway to I-280*

  This was the first meeting for the public to hear the project objectives and preliminary planning schedule. The meeting with a same agenda was held at three different locations along the project area for the convenience of the residents:

  1. October 23, 2006 at Empire Gardens Elementary School;
  2. October 24, 2006 at Selma Olinder Elementary School;
  3. November1, 2006 at Orchard Elementary School.

  The questions and concerns were gathered during the meetings and were posted on the district website with district's responses. Most concerns were about the trash and creek maintenance.

- *Conceptual Alternatives for project area from Montague Expressway to I-280*

  1. June 1, 2009 at Selma Olinder Elementary School;
  2. June 3, 2009 at Orchard Elementary School;
  3. June 6, 2009 bus tour to project area and Anderson Dam.

  The majority of the residents opposed all of the channel improvement from Lower Silver Creek confluence to I-280. Most expressed a desire to pursue studying the upstream reservoir modification and upstream offstream storage alternatives. The alternatives were presented to the public and no objection was received. In addition, public continued to express concerns for homeless encampments.

- *Feasible Alternatives for project area from Montague Expressway to Berryessa Road*

  1. September 7, 2011 at Orchard Elementary School.

5.3.3 Coyote Watershed Integrated Working Group (CWIWG) Special Meetings

This integrated working group is an advisory to the project team staff. It's goals are to provide regular coordination with regulatory and other agency staff, to reach agreement before any issues occur during the project development, and to integrate the permitting process with CEQA/NEPA compliance. In each of the committee meeting, the project team was updated the committee with the status and issues of the project and the committee was provided comments to the project team.

5.3.4 Meetings with City of San Jose

Coordination meetings with the city of San Jose were held to update the city about our progress and understand the projects that the city has developed along the Mid-Coyote project reach. These meetings were opportunities to discuss mutual benefits and impacts and collect early feedback and comments.

- August 1, 2006: met on Watson Park project;
- November 15, 2006: gave presentation on project progress to Strong Neighborhood Initiative Program;
- February 8, 2007: attended Watson Park project progress meeting;
- June 13, 2007: attended Watson Park project progress meeting;
- November 15, 2007: presented the project to the planning staff to discuss future land use impacts.

5.4 PROJECT SELECTION

5.4.1 Summary of the NFP Procedure

As required by the ends policy, the procedure balances the nine NFP objectives. Various criteria (as few as one to as many as eight) were developed to help rate each objective. These criteria were:

Objective 1: Provide Protection from Flood Damage

Criterion 1: Safety – protection of public safety if conditions exceed design assumptions

Criterion 2: Economic Protection – Protection from damage due to floodwater, erosion or sediment for homes, schools, businesses, transportation systems and other infrastructure

Criterion 3: Durability – future effort required to maintain design level of protection

Criterion 4: Resiliency – adaptability to future changes

Criterion 5: Local Drainage – support of local storm drain systems

Criterion 6: Time to Implementation – how quickly flood protection elements could become effective

Objective 2: Support Ecological Functions and Processes

Criterion 1: Meets Local Habitat Goals – Ability to meet habitat goals as defined from examining the watershed as a whole and accounting for opportunities and constraints specific to the project area

Criterion 2: Quality of Habitat – Quality of habitat provided by alternative

Criterion 3: Sustainability of Habitat – Intensity of future human intervention required to maintain the target habitat quality; opportunity for habitat to self-adjust appropriately to future change

Criterion 4: Connectivity of Habitat – Integration of habitat elements into surrounding habitat landscape and within project area

Objective 3: Physical Stream Functions and Processes

Criterion 1: Floodplain – Inclusion of an appropriately-sized overflow area within the flood conveyance corridor that effectively conveys high flows and dissipates erosive energy ("multi-stage" channel)

Criterion 2: Active Channel – Appropriateness of size and configuration of the active channel relative to watershed inputs and reach characteristics

Criterion 3: Stable Side Slopes – Stability of Channel side slopes using geotechnical or biotechnical methods

Criterion 4: Upstream / downstream Transitions – Stability of channel's integration with upstream and downstream reaches

Objective 4: Minimize Maintenance Requirements

Criterion 1: Structural Features – Maintenance requirements associated with structural features within project corridor

Criterion 2: Natural Processes – Maintenance requirements associated with vegetation growth, erosion, and sediment processes

Criterion 3: Urban Flows – Maintenance requirements resulting from smaller, high frequency storm events and outfall flows

Criterion 4: Access – incorporation of adequate access for maintenance crews and equipment

Objective 5: Integrate Within Watershed

Criterion 1: Meets Local Watershed Goals – Ability to meet watershed goals as defined in a process that examines the watershed as a whole and accounts for opportunities and constraints specific to the project area

Objective 6: Protect the Quality and Availability of Water

Criterion 1: Water Availability – impact on groundwater recharge

Criterion 2: Groundwater Quality – Groundwater quality protection from contamination and the threat of contamination by preventing contaminant entry into groundwater

Criterion 3: Instream Water Quality – Water quality protection through vegetation and instream hydraulic complexity

Criterion 4: Offstream Water Management – Ability to enhance water supply and quality and reduce peak flows through local retention of rainfall and pollution prevention programs

Criterion 5: Flow Regime – Ability to maintain geomorphically and biologically appropriate range of flows – quantity and timing

Objective 7: Cooperate with Other Local Agencies to Achieve Mutually Beneficial Goals

Criterion 1: Mutual Local Goals – ability to achieve project-specific goals and objectives developed jointly by the District and local agencies developed jointly by the District and local agencies
Criterion 2: Supports General Plan – Ability to support goals and policies as stated in general plans of partner agencies

Objective 8: Maximize Community Benefits Beyond Flood Protection

Criterion 1: Community Safety – Overall safety for appropriate access and recreation

Criterion 2: Recreation – Quality of recreation experience provided by alternative

Criterion 3: Aesthetics – Quality of aesthetic form provided by alternative

Criterion 4: Social and Cultural Benefits – Opportunity through programs or physical features to promote community involvement

Criterion 5: Local Economic Effects – Potential effect on property values and/or local business climate

Criterion 6: Green Construction and Operation – Reflection of the District's commitment to minimize its impact on the environment

Criterion 7: Open Space – Incorporation of open space into alternative design

Criterion 8: Community Support – Alternative reflects community developed objectives and ideas

Objective 9: Minimize Life-Cycle Costs

Criterion 1: Capital Cost -– Net Present Value of Estimated Cost

Criterion 2: Maintenance Cost – Net Present Value of all maintenance costs over the life of the project

Some of the criteria required comparative ratings between the alternatives (for example, which alternative has the least or the most cost) while others were stand-alone ratings (for example, how well does the alternative meet community goals). Each alternative was rated as to how well it accomplished each criterion. A scoring system assigned various weights to the criteria and calculated the objective score (see Appendix F for NFP rating details) for each alternative. The result is a matrix (see Table 5-1: Recommended Alternative Selection) which shows a comparison of how well the alternatives rated on each of the nine NFP objectives.

5.4.2 Staff Recommended Alternative Selection

The staff recommended alternative was selected based on a comparison of the NFP ratings of all the alternatives (see Table 5-1).

In the rating process, Alternatives B and D stand out because of the high ranking at each NFP objective category. Alternative B would provide lower water surface elevation, lower flood wall/flood levee and sufficient capacity for flood protection. The channel widening and newly created flood benches would improve the quality and quantity of habitat and connectivity to provide a healthier ecological environment. However, the cost for this alternative exceeds the funding available in the CSC Program. Alternative B would require real estate acquisition and relocation of major petroleum businesses and infrastructure. Alternative D would also provide the above benefits with an affordable cost for the construction. Mostly, Alternative D would occur within SCVWD right-of-way.

Thus, using the NFP process, Alternative D is, on balance, ranked the best among all of the alternatives considered.

Table 5-1 Recommended Alternative Selection

District Ends Policy 2.2.1 (Natural Flood Protection):	Objective Weight Rank:	Alt. A	Alt.B	Alt. C	Alt. D
1. Provide protection from flood damage	High	○	◕	◕	◕
2. Support ecological functions and processes	High	○	◒	◔	◒
3. Integrate physical stream functions and processes	Med	○	◕	○	◕
4. Minimize maintenance requirements	High	○	◒	◔	◒
5. Integrate within the context of the watershed	High	⊗	◒	○	◔
6. Protect the quality and availability of water	Low	◒	◒	◒	◒
7. Cooperate with other local agencies to achieve mutual goals	High	○	○	○	○
8. Maximize community benefits beyond flood protection	High	○	◒	◒	◒
9. Minimize life-cycle costs	Med	●	⊗	◒	◒

Ratings Key:

Outstanding: ●
Very Good: ◕
Adequate: ◒
Fair: ◔
Poor: ○
Unacceptable: ⊗

Note: Objective weight ranks from Watershed Owner, see Table 1-1
10 - 9 high
8 - 7 medium
under 6 low

CHAPTER 6: DESCRIPTION OF STAFF RECOMMENDED PROJECT

6.1 PROPOSED MEASURES

Between Montague Expressway and Charcot Avenue Bridge, the east bank would be excavated and lowered by 5 feet. The creek at this reach would also be widened by about 10 feet at the upper slopes and a flood bench would be created at a bankful elevation, about 4 feet above the creek invert. The required floodwall heights would vary from 2 to 6 feet on the west bank and 7 to 11 feet on the east bank including a sufficient free board.

The west floodwall would end at downstream face of Charcot Avenue Bridge, and then a 5-feet high levee would be constructed instead between the creek and SCVWD Maintenance Yard. The slope of the levee on creek side would be at a ratio of 2:1, while the outside slope would extend to the property boundary at 2%.

At upstream of O'Toole, a 5-foot high flood wall would be constructed to protect the State Corp yard from flooding.

Charcot Avenue Bridge would be replaced and raised by 6 feet to provide conveyance and a required free board. To accommodate the new elevation, about 200 feet long of the street surface, on both sides of the bridge, would be regraded at 3% and retaining walls might be constructed along the private property lines.

A continuous 20-ft-wide maintenance road would be constructed at the inboard side of the floodwalls and top of the levee. While the vegetation in the creek would be selectively removed, the existing vegetation on east side of creek would be removed and replanted after the improvements. Figure 5-3 is a typical cross section for this reach.

6.2 RIGHT-OF-WAY REQUIREMENTS

The improvements between Montague and O'Toole would be performed within the existing SCVWD right-of-way. The 5-foot floodwall construction from O'Toole to I-880 would need 0.5 ac of easement from the State of California.

6.3 ENVIRONMENTAL ENHANCEMENT OPPORTUNITIES

Opportunities exist to improve the water quality in Coyote Creek above and beyond core project objectives by reducing the amount of trash that enters the channel through the City of San Jose storm drain system. Structural improvements to existing storm drain outlets within the project reach could reduce litter that enters the creek and flows downstream to the San Francisco Bay.

The City of San Jose certified a Short-term Trash Load Reduction Plan in January 2012, which includes various trash generation, interception, and cleanup control measures. Among the recommended control measures are two measures designed to intercept trash in waterways, partial and full capture treatment devices. A full capture system or device is defined as any single device or series of devices that traps all particles retained by a 5 mm mesh screen and has a design treatment capacity of not less than the peak flow rate (Q) resulting from a one-year, one hour storm in the sub-drainage area (RWQCB 2009). Partial capture devices are treatment devices that have not been approved as full capture by the San Francisco Bay Regional Water Quality Control Board but capture trash at a known effectiveness value.

Example partial and full capture treatment devices include screens, litter booms/curtains, trash racks, catch basin inserts, hydrodynamic separators, gross solids removal devices, and baffle boxes (CASQA 2003; Gordon and Zamist 2006). Not all partial or full capture devices are suitable “end-of-pipe” or in-stream solutions that can be implemented within the limits of the proposed flood protection project; however, appropriate devices could be considered for installation during construction of the proposed project. Implementation of partial and/or full capture treatment devices beyond the Short-term Trash Load Reduction Plan goals would enhance the creek aesthetics and ecosystem and, as an additional benefit, would contribute to efforts toward long-term trash reduction goals. Installation concurrent with the proposed flood protection project would also minimize the potential environmental impacts resulting from repeated disturbance to riparian habitats due to construction activities in the project corridor.

To pursue and implement suitable structural device solutions, the district will need to acquire an understanding of the frequency and intensity of stormwater flow, site characteristics and limitations, device performance, maintenance feasibilities, and budget accordingly.

The proposed project also provides an opportunity for recreational enhancements through trail development along the creek corridor within the project limits. The City of San Jose proposed a trail alignment along Coyote Creek in its Draft Coyote Creek Trails Master Plan (San Jose 2011). The City’s recommended trail alignment would begin at an access point on the west bank of Coyote Creek, on the south side of Montague Expressway. The trail would connect to an existing paved ramp leading north towards an existing segment of the Coyote Creek Trail. The recommended trail alignment would include a freespan bridge over the creek to bring the trail to the east bank. The trail would follow along the existing District service road and cross beneath Charcot Avenue (at grade access points would be provided on both sides of Charcot Avenue) to approach O’Toole Avenue. The trail would continue along the creek under O’Toole Avenue and Interstate 880 before exiting the proposed flood protection project limits and connecting with Brokaw Road and beyond.

Replacement of the Charcot Avenue bridge to accommodate flood waters would provide the opportunity to design sidewalks and bike lanes into the new bridge. Construction of sidewalks across the bridge would provide continuous sidewalks along Charcot Avenue where they currently do not exist. A connection to planned bike lanes along Charcot Avenue would enhance bike access to the trail from the neighborhood. Additionally, with the provision of trail user crossing at Charcot Avenue, the proposed Coyote Creek Trail segment could be aligned on the western bank of Coyote Creek between Montague Expressway and Charcot Avenue. Installation of a trail on the western bank of Coyote Creek between Montague Expressway and Charcot Avenue would satisfy the goals and objectives of the Trails Master Plan, while eliminating the need to install a separate freespan pedestrian bridge at Montague Expressway. Upon its completion, the trail would offer enhanced recreational and transportation opportunities to those who live, work, and play in the neighboring vicinities. Construction of the Coyote Creek Trail segment within the proposed flood protection project limits would open a 2.5-mile continuous path from Brokaw Road in San Jose to Highway 237 and the Bay Trail to the north.

6.4 CONSTRUCTION PROCEDURES

Typical construction of the floodwall in the project would begin with trench excavation, followed by form work installation, concrete pouring, backfill, and aesthetic texturing on the face of the wall.

The construction of continuous access under bridges includes removal of channel bank lining upstream and downstream of the bridges and ramp construction. Coffer dams will likely be needed for most construction. The Standard Construction BMP would be implemented.

Construction would also include constructing a new bridge at Charcot Avenue which involves traffic control, excavation, piling, form work installation, concrete pouring, backfill, and pavement construction.

Construction of levees on the bank of the natural stream channel would consist of clearing and grubbing, excavating and compacting material for the levee, and constructing a maintenance road on top of the levee.

Revegetation areas in this reach would be planted with riparian plant species as designated in the mitigation plan after all construction activities are completed; typically this would be done in fall for the best survival rates.

CHAPTER 7: OPERATION AND MAINTENANCE PROGRAM

The maintenance activities that would be specific to the project reach are typical of what is required to keep the planned infrastructure to the standards for which it is designed. Alternative D, the staff recommended alternative, has three types of planned infrastructure which will require routine maintenance and annual inspection. Levees, floodwalls and instream benches will be described in general terms relative to what is established maintenance of these structures without knowing the specific details of the design (i.e. type of floodwall).

Sediment removal and erosion protection are two maintenance activities which may occur at some interval within the proposed project reach after construction is complete. However, without knowing the specifics of the flood protection design these two activities will be described in general terms as the type of maintenance activities and subsequent procedures which will be followed once a more detailed design for the proposed project is forthcoming.

It is presumed that all maintenance described in this chapter will follow parameters outlined in the District's County wide Stream Maintenance Program (SMP) (2012) which provides environmental coverage for conducting routine maintenance for streams in Santa Clara County. The SMP includes maintenance activities such as; sediment removal, erosion protection, vegetation management and minor activities associated with existing infrastructure (i.e. graffiti removal, fence repair etc.)

7.1 LEVEE MAINTENANCE

Levee maintenance will include keeping the vegetation on the slopes and crest of the levee in good condition. Properly maintained levee vegetation provides a low grass covered surface to assist with identifying abnormalities on the levee surface and to assist with soil stability when water flows against the levee. Levees will be mowed on the slopes to facilitate annual inspection of the toe area and levee surface to ensure there are no slumping, scours, openings caused by animal damage or weak spots which could lead to water seepage and eventually piping failure. Mowing levee slopes is typically done with a mechanical boom mower but may require hand removal if the boom mower cannot adequately remove or trim vegetation to expose the levee toe area. Chemical application of herbicide is used on the levee crest to control weedy vegetation on the access road surface for longer periods of time. For herbicide application to be effective it is typically applied once in the calendar year to capture the pre-emergence and at least twice to post emergence cycles of vegetative growth. Spot spraying of herbicide may also occur on levee slopes to control woody growth particularly if any exotic/invasive woody vegetation colonizes the project area.

In addition to the vegetation management activities described for levee maintenance, other routine maintenance may occur for levees depending on the results of the annual inspection cycle. If burrowing rodent damage is readily apparent during the inspection process this may trigger rodent control measures such as live trapping, baiting or fumigation. Burrowing rodent damage may require repairs to the levee crest and slopes to avoid slumping, subsidence or piping failures. Repairs to the levee may include filling or compacting burrows to avoid seepage or other structural damage. Repairs also include regrading the levee crest to re-establish a smooth driving surface or to restore the elevation provided by the original project.

7.2 FLOODWALL MAINTENANCE

Once a floodwall system is constructed an inspection schedule will be adopted to ensure that the structural integrity of the floodwall will remain operational during flooding conditions. The annual inspection will include at a minimum; dates of inspection, general floodwall observations involving cracking, deteriorated mortar joints, fatigue, misalignments or chipping, sealant observation including displacement, cracking and leakage, description of ponding water/leakage, and site drainage. Additionally, floodwalls will be inspected post flooding events to ensure that the floodwall did not sustain structural damage, including excessive erosion or scour damage associated with the flood event.

Graffiti removal will also occur as a routine maintenance activity associated with floodwalls. It is unclear what the frequency of the graffiti removal will be until after construction is complete but the presumption that this activity will occur at least once a year is similar to graffiti management at other District owned facilities.

7.3 INSTREAM BENCHES

The level of maintenance required for an instream bench largely depends on the engineered parameters (i.e. Manning's coefficient) modeled for best function of the bench. If the bench is allowed to have some vegetation (i.e. wetland or herbaceous vegetation) colonize the area without potentially impeding flood flows or affecting channel capacity, then maintenance can be limited to removal of woody vegetation only. Two methods for control of woody vegetation would be employed on the benches and that includes hand removal and herbicide application.

7.4 SEDIMENT REMOVAL

Sediment removal will occur within the project site when an accumulation of sediment reduces the flood water conveyance capacity or keeps any of the structures proposed in this project from functioning appropriately. The quantity, frequency and location of sediment removal will vary each year depending on rainfall and upstream sources of sediment (i.e. mass wasting, bank failure). Sediment removal typically occurs from June 15 to October 15 using a variety of heavy equipment and likely will require the installation of a water diversion system while sediment removal operations are conducted.

7.5 EROSION PROTECTION

Erosion protection involves an action by the District to repair stream banks or benches that are eroding or are in need of preventative erosion protection. The District will implement erosion control measures if the damage area causes or could have the potential to; cause significant damage to a property or an adjacent property, is a public safety concern, adversely affects recreation or transportation, adversely affects water quality or other beneficial uses, or adversely affects riparian habitat. Different methods for erosion protection are outlined in the District's SMP bank protection manual but identification of a specific method requires more detailed site specific information.

7.6 LARGE WOODY DEBRIS MANAGEMENT

Coyote Creek within the project area is currently identified as critical habitat for steelhead trout. As a requirement under SMP permits the District must manage and mitigate removal of large woody debris if removal is deemed necessary for preserving flood protection. The District has a four tiered approach to large woody debris management that includes; leaving the wood in place, modifying the wood to allow large flows and debris to pass, moving to the wood elsewhere within the watershed or removing entirely. If the wood needs to be removed entirely, mitigation is required within the watershed. The SMP includes instructions for determining appropriate mitigation compensation for removed wood.

7.7 TRASH MANAGEMENT

Improved maintenance access to the project reach will allow for a more coordinated effort to clean up trash and debris from the waterway. Trash loading is high in Coyote Creek particularly as the creek flows through downtown San Jose. In addition, the increased maintenance access will allow for removal of illegal encampments to be more readily accessed for removal and clean up.

CHAPTER 8: PROJECT COST, FINANCING, AND SCHEDULE

The total project construction cost for the recommended project is $27 million in 2011 dollars. The cost estimate is summarized in the Appendix A.

The design and construction for the project reach would be funded by the District's Clean, Safe Creeks Program approved by the voters in 2000.

The project design is expected to commence in summer of 2012. Construction drawings and specifications is planned to be completed by Spring of 2014, so construction can start in summer of 2014. Staff anticipates that construction will take 2 years to complete.

CHAPTER 9: CONCLUSIONS AND RECOMMENDATIONS

The existing flood carrying capacity of Coyote Creek between Montague Expressway and I-880 is less than 1 percent design flow. A 1 percent flood protection in this reach would benefit future flood protection for the upstream reaches.

The staff recommended project would provide protection to the community from the 1 percent flood and would accomplish the District’s Clean Safe Creek Natural Flood Protection objectives. The following are the beneficial impacts of the project:

- Flooding: provides flood protection from 1 percent flood.
- Maintenance: provides better access for maintenance.
- Erosion: repairs areas of active erosion, and protects banks from future erosion potential.
- Water quality: decreases sediment and turbidity in water contributed from erosion of banks.
- Riparian vegetation: existing vegetation would be selectively removed and the native vegetation would be replanted.
- Wildlife and fish habitats: would provide opportunities to enhance ecological stream functions.
- Recreation: complements the City's park and trail master plan and allows for 1.2 miles of future trail development.

Therefore, it is recommended that the staff recommended project be approved and design plans be prepared for construction of the project.

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GLOSSARY

aggradation	The geologic process by which streambeds and flood plains are raised in elevation by the deposition of material eroded and transported from other areas. The opposite of degradation.
alluvial	Pertaining to material or processes associated with transportation and/or subaerial deposition by concentrated running water.
aquifer	A body of rock that absorbs water slowly, but does not transmit it fast enough to supply a well or spring.
bank erosion	Removal of sediment and soil particles from a bank, primarily by running water. Climate, ice, debris, chemical reactions, and changes in land and stream use may also contribute to bank erosion.
confined aquifer	Characterized by upper and lower aquifers, divided by a continuous, aerially extensive, zone of low permeability clays, silty clays, silts, and silty/clayey sands and gravels. This low permeability zone ranges in thickness laterally, is typically encountered at different depths. Groundwaters encountered in the confined aquifer are flowing under artesian conditions. Recharge to the confined aquifer can occur either in a recharge area where the aquifer crops out, or by slow downward leakage through leaky confining layer.
cultural resource	Prehistoric or historic remains exhibiting significance for understanding past lifeways.
design flow	The magnitude of stream flow that is used in design of channel modifications and structures across channels.
discharge	The volume of water passing through a channel during a given period of time. Usually measured in cubic feet per second.
flood conveyance	The ability of a channel to carry or move flood waters. Capacity.
flood plain	A wide, gentle sloping area subject to periodic flooding from flood flows. Land adjacent to a stream channel, at or above the elevation of bank full discharge. The flood plain typically consists of a flight of several benches or terraces with progressively higher elevations flanking the active channel. Benches at lower elevations are typically inundated about 2 of 3 years on average; higher-level benches are inundated only in larger flood events that recur on a longer cycle (10 to 100 years). The flood plain develops as sediment is deposited by warning flood waters.
freeboard	Vertical distance between the top of an embankment adjoining a channel and the water level in the channel. It is a factor of safety designed into a project.

forebay	A hydrographic zone which occurs along the elevated edges of the groundwater subbasins and where aquifer materials predominate. The elevated forebay area fill materials were deposited as alluvial fans emanating from streams as they debouch into the valley. The forebay consists predominantly of coarse (sand and gravel) aquifer materials with discontinuous, often leaky aquitards (clay and silts).
geomorphology	The branch of earth sciences that deal with the shape and development of land forms.
habitat	The environmental context in which an animal or plant normally lives among its associated species.
hazardous material	Raw material and products that, because of their quantity, concentration, or physical or chemical characteristics, pose a significant present or potential danger to human health and safety or to the environment.
hydraulics	The engineering sub-discipline that addresses the flow of water and other fluids, including the pratical effects and control of moving water. Also refers to the relationship between channel geometry, flow velocity, and depth of water in a natural or artificial channel.
hydrology	Referring to the physical behavior of water.
invert	The lowest point in the bed or channel of a river or stream.
land form	The shape into which the land surface area is sculptured by natural forces or the configuration of the land.
land subsidence	Broad sagging of land surface due to the reduction of pressure in the deep confined aquifer caused by long-term overdraft of the groundwater basin.
levee	A natural or artificial embankment along a river. The term levee is generally applied when the riverbank rises above the level of the adjacent flood plain. Some natural streams, especially those with low gradient and meandering channels, have naturally aggraded levees.
maintenance	The activities necessary to ensure that the elements of a project continue to operate properly after construction.
National Register of Historic Places (NRHP)	Established in 1966 to recognize resources associated with the accomplishments of all people who have contributed to the country's history and heritage. Guidelines based upon the integrity and significance of resources were designed to assist national and state entities in determining eligibility for nomination to the Register. Resources listed on the Register are afforded legal protection from adverse impact to preserve the nation's cultural record.
one percent (1%) flood event	A flood that has a one percent chance of being equaled or exceeded in any given year. Also called a one-hundred-year flood.

peak flow	The maximum discharge (flow volume) of a stream during a specified period of time.
percolation	The downward movement of water through the soil.
recharge	Replenishing of groundwater reserves, typically by infiltration or percolation of surface water downward through permeable surface materials into the subsurface.
riparian	Situated on or pertaining to the bank of a river, stream, or other body of water. Used to refer to vegetation and wildlife living within and immediately adjacent to a river, stream, or lake.
unconfined aquifer	An aquifer close to land surface, with continuous layers of materials of high intrinsic permeability extending from the land surface to the base of the aquifer. Recharge to the aquifer can be from downward seepage through the unsaturated zone.

APPENDIX A

Detailed Cost Estimate

COYOTE CREEK FLOOD PROTECTION PROJECT, #26174043
Montague Expressway to Interstate 880
Alternative B
Cost Estimate Summary

Revised: 5/1/12

Item	Unit Cost	Unit	Quantity	Amount
Site Preparation				
Clearing and Grubbing	$50,000	ACRE	34.8	$1,742,456
Vegetation demolition	$10,000	ACRE	13.4	$133,863
Building demolition	$10,000	ACRE	6.2	$62,302
Coffer dams installation and removal	$50,000	LS	0.0	$0
Earthwork				
Structural excavation	$65	C.Y.	0.0	$0
Excavation	$20	C.Y.	275,451.1	$5,509,022
Fill	$10	C.Y.	0.0	$0
Floodwall Construction				
Floodwall	$1,000	C.Y.	6,027.6	$6,027,569
Levee Construction				
Levee	$50	C.Y.	0.0	$0
Bridges and Culverts				
Bridge Removal	$100,000	EA.	1.0	$100,000
District Cost To Replace Charcot Ave. Bridge	$3,000,000	EA.	1.0	$3,000,000
Traffic Control	$100,000	EA.	1.0	$100,000
Utility Relocation/Modification				
Pipeline Gas Main	$100	L.F.	3,665.0	$366,500
Sanitary Sewer Line Relocation	$200	L.F.	0.0	$0
Water Main	$100	L.F.	480.0	$48,000
Outfalls (12in. - 54in.)	$5,000	EA.	5.0	$25,000
Outfalls (60in. - 78in.)	$10,000	EA.	1.0	$10,000
Roadway Work	$20	S.F.	0.0	$0
Miscellaneous				
Armoring Aggregate. (6in. Maint. Rd.)	$1.00	S.F.	0.0	$0
Gates	$800	EA.	0.0	$0
Fencing	$10	L.F.	0.0	$0
Water Quality Monitoring	$100,000	EA.	0.0	$0
SUBTOTAL				$17,124,712
Construction Contingencies (25%)				$4,281,178
TOTAL CONSTRUCTION				**$21,405,890**
Design (15%)				**$3,210,883**
Geotechnical (5%)				**$1,070,294**
Inspection (15%)				**$3,210,883**

COYOTE CREEK FLOOD PROTECTION PROJECT, #26174043
Montague Expressway to Interstate 880
Alternative B
Cost Estimate Summary

Item	Unit Cost	Unit	Quantity	Amount
Property Acquisition (per Real Estate cost estimate)				
Residential (complete)	$2,000,000	E.A.	0.0	$0
Residential (partial)	$1,000,000	ACRE	0.0	$0
Residential (creek)	$5,000	ACRE	0.0	$0
Commercial (partial)	$1,000,000	ACRE	15.0	$14,994,787
Commercial (creek)	$5,000	ACRE	0.0	$0
Commercial (relocate on site)	$500,000	EA.	9.0	$4,500,000
Public (partial)	$200,000	ACRE	0.0	$0
Public (creek)	$5,000	ACRE	0.0	$0
Public (relocate on site)		EA.	0.0	$0
Manufactured homes	$600,000	E.A.	0.0	$0
RIGHT-OF-WAY COSTS				**$19,494,787**
Mitigation				
Revegetation (on-site)	$200,000	ACRE	13.4	$2,677,251
Revegetation (off-site)	$200,000	ACRE	0.0	$0
Revegetation right-of-way (off-site)	$200,000	ACRE	0.0	$0
MITIGATION COSTS				**$2,677,251**
TOTAL COSTS				**$51,069,990**

COYOTE CREEK FLOOD PROTECTION PROJECT, #26174043

Montague Expressway to Interstate 880

Alternative C

Cost Estimate Summary

Revised: 5/1/12

Item	Unit Cost	Unit	Quantity	Amount
Site Preparation				
Clearing and Grubbing	$50,000	ACRE	4.2	$210,000
Vegetation demolition	$10,000	ACRE	23.9	$238,500
Building demolition	$100,000	Building	0.0	$0
Coffer dams installation and removal	$50,000	L.S.	0.0	$0
Earthwork				
Structural excavation	$65	C.Y.	0.0	$0
Excavation	$20	C.Y.	0.0	$0
Fill	$10	C.Y.	0.0	$0
Floodwall Construction				
Floodwall	$1,000	C.Y.	5,419.0	$5,419,000
Levee Construction				
Levee	$50	C.Y.	27,451.0	$1,372,550
Bridges and Culverts				
Bridge Removal	$100,000	EA.	1.0	$100,000
District Cost To Replace Charcot Ave. Bridge	$3,000,000	EA.	1.0	$3,000,000
Traffic Control	$100,000	EA.	1.0	$100,000
Utility Relocation/Modification				
Pipeline Gas Main	$100	L.F.	0.0	$0
Sanitary Sewer Line Relocation	$200	L.F.	0.0	$0
Water Main	$100	L.F.	0.0	$0
Outfalls (12in. - 54in.)	$5,000	EA.	5.0	$25,000
Outfalls (60in. - 78in.)	$10,000	EA.	1.0	$10,000
Roadway Work	$20	S.F.	0.0	$0
Miscellaneous				
Armoring Aggregate. (6in. Maint. Rd.)	$1.00	S.F.	0.0	$0
Gates	$800	EA.	0.0	$0
Fencing	$10	L.F.	0.0	$0
Water Quality Monitoring	$100,000	EA.	0.0	$0
SUBTOTAL				$10,475,050
Construction Contingencies (25%)				$2,618,763
TOTAL CONSTRUCTION				**$13,093,813**
Design (15%)				$1,964,072
Geotechnical (5%)				$654,691
Inspection (15%)				$1,964,072
				$17,676,647

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Revised: 5/1/12

COYOTE CREEK FLOOD PROTECTION PROJECT, #26174043
Montague Expressway to Interstate 880
Alternative C
Cost Estimate Summary

Item	Unit Cost	Unit	Quantity	Amount
Property Acquisition (per Real Estate cost estimate)				
Residential (complete)	$2,000,000	E.A.	0.0	$0
Residential (partial)	$1,000,000	ACRE	0.0	$0
Residential (creek)	$5,000	ACRE	0.0	$0
Commercial (partial)	$1,000,000	ACRE	0.0	$0
Commercial (creek)	$5,000	ACRE	0.0	$0
Commercial (relocate on site)	$500,000	EA.	0.0	$0
Public (partial)	$200,000	ACRE	0.5	$100,000
Public (creek)	$5,000	ACRE	0.0	$0
Public (relocate on site)		EA.	0.0	$0
Manufactured homes	$600,000	E.A.	0.0	$0
RIGHT-OF-WAY COSTS				**$100,000**
Mitigation				
Revegetation (on-site)	$200,000	ACRE	23.9	$4,780,000
Revegetation (off-site)	$200,000	ACRE	0.0	$0
Revegetation right-of-way (off-site)	$200,000	ACRE	0.0	$0
MITIGATION COSTS				**$4,780,000**
TOTAL COSTS				**$22,556,647**

COYOTE CREEK FLOOD PROTECTION PROJECT, #26174043

Revised: 5/1/12

Montague Expressway to I-880
Alternative D
Cost Estimate Summary

Item	**Unit Cost**	**Unit**	**Quantity**	**Amount**
Site Preparation				
Clearing and Grubbing	$50,000	ACRE	4.2	$210,000
Vegetation demolition	$10,000	ACRE	23.9	$239,000
Building demolition	$100,000	Bldg	0.0	$0
Coffer dams installation and removal	$50,000	LS	0.0	$0
Earthwork				
Structural excavation	$65	C.Y.	0.0	$0
Excavation	$20	C.Y.	58,260.0	$1,165,200
Fill	$10	C.Y.	1,692.0	$16,920
Floodwall Construction				
Floodwall	$1,000	C.Y.	6,511.0	$6,511,000
Levee Construction				
Levee	$50	C.Y.	27,451.0	$1,372,550
Bridges and Culverts				
Bridge Removal	$100,000	EA.	1.0	$100,000
District Cost To Replace Charcot Ave. Bridge	$3,000,000	EA.	1.0	$3,000,000
Traffic Control	$100,000	EA.	1.0	$100,000
Utility Relocation/Modification				
Pipeline Gas Main	$100	L.F.	3,665.0	$366,500
Sanitary Sewer Line Relocation	$200	L.F.	0.0	$0
Water Main	$100	L.F.	480.0	$48,000
Outfalls (12in. - 54in.)	$5,000	EA.	5.0	$25,000
Outfalls (60in. - 78in.)	$10,000	EA.	1.0	$10,000
Roadway Work	$20	S.F.	0.0	$0
Miscellaneous				
Armoring Aggregate. (6in. Maint. Rd.)	$1.00	S.F.	0.0	$0
Gates	$800	EA.	0.0	$0
Fencing	$10	L.F.	0.0	$0
Water Quality Monitoring	$100,000	EA.	0.0	$0
SUBTOTAL				$13,164,170
Construction Contingencies (25%)				$3,291,043
TOTAL CONSTRUCTION				**$16,455,213**
Design (15%)				$2,468,282
Geotechnical (5%)				$822,761
Inspection (15%)				$2,468,282
				$22,214,537

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COYOTE CREEK FLOOD PROTECTION PROJECT, #26174043

Montague Expressway to I-880

Alternative D

Cost Estimate Summary

Item	**Unit Cost**	**Unit**	**Quantity**	**Amount**
Property Acquisition (per Real Estate cost estimate)				
Residential (complete)	$2,000,000	E.A.	0.0	$0
Residential (partial)	$1,000,000	ACRE	0.0	$0
Residential (creek)	$5,000	ACRE	0.0	$0
Commercial (partial)	$1,000,000	ACRE	0.0	$0
Commercial (creek)	$5,000	ACRE	0.0	$0
Commercial (relocate on site)	$500,000	EA.	0.0	$0
Public (partial)	$200,000	ACRE	0.5	$100,000
Public (creek)	$5,000	ACRE	0.0	$0
Public (relocate on site)		EA.	0.0	$0
Manufactured homes	$600,000	E.A.	0.0	$0
RIGHT-OF-WAY COSTS				**$100,000**
Mitigation				
Revegetation (on-site)	$200,000	ACRE	23.9	$4,780,000
Revegetation (off-site)	$200,000	ACRE	0.0	$0
Revegetation right-of-way (off-site)	$200,000	ACRE	0.0	$0
MITIGATION COSTS				**$4,780,000**
TOTAL COSTS				**$27,094,537**

APPENDIX B

Natural Flood Protection Ratings Details

Coyote Creek Flood Protection Planning Study

Natural Flood Protection (NFP) Criteria Ratings

Notes:

(1) Each NFP criterion is rated for each alternative

(2) Criterion rating guidance is from WWW75125 Guidance on Alternative Selection & Evaluation for Natural Flood Protection Projects (Revision R2, Effective Feb 3, 2009)

(3) The ratings are according to the following key:

0 = Unacceptable
1 = Poor
2 = Fair
3 = Adequate
4 = Very good
5 = Outstanding

Objective 1—Homes, schools, businesses and transportation networks are protected from flooding and erosion (E-2.2.1.1)

Criterion 1: Safety – Protection of public safety if conditions exceed design assumptions

Rating Guidance:

Outstanding: Alternative continues to provide for public safety when flows exceed design flow

Adequate: Alternative improves safety compared to existing conditions when flows exceed design flow

poor: Alternative provides safety only up to design flow

Unacceptable: Alternative will not provide safety when design flow comes

Alternative	Rating	Score	Comments
A	Unacceptable	0	Does not improve on current conditions
B	Very good	4	4’ freeboard would provide protection when flow exceeds the 100 year design flow.
C	Very good	4	Same as Alt B.
D	Very good	4	Same as Alt B.

Objective 1— Homes, schools, businesses and transportation networks are protected from flooding and erosion (E-2.2.1.1)

Criterion 2: Economic Protection – Protection from damage due to floodwater, erosion or sediment for homes, schools, businesses, transportation systems and other infrastructure

Rating guidance:

Outstanding: exceeds federal and local standards for flood protection facilities.

Adequate: meets federal standards for flood protection facilities.

Poor: floods less than design flood may cause damage to instream features

Unacceptable: flows less than the design flood would likely cause substantial damage to instream features

Alternative	Rating	# Score	Comments
A	Unacceptable	0	Channel features are likely to fail due to less than design flood flows.
B	Very Good	4	Freeboard is designed 1’ higher than FEMA, and local standards.
C	Very Good	4	Same as alt B.
D	Very Good	4	Same as alt B.

Objective 1— Homes, schools, businesses and transportation networks are protected from flooding and erosion (E-2.2.1.1)

Criterion 3: Durability – Future District effort required to maintain design level of protection

Rating Guidelines:

Outstanding: level of protection virtually independent of future actions

Adequate: level of protection dependent on future actions which are realistic to apply

Poor: level of protection dependent on future actions which may be difficult to apply

Unacceptable: level of protection dependent on intense level of future action which may fail

Alternative	Rating	# Score	Comments
A	Unacceptable	0	Condition unchanged
B	Adequate	3	Widened channel, but some levees that need high maintenance
C	Adequate	3	Same as alt B.
D	Adequate	3	Maintenance of floodwalls and levees

Objective 1— Homes, schools, businesses and transportation networks are protected from flooding and erosion (E-2.2.1.1)			
Criterion 4: Resiliency – Adaptability to future changes Rating guidance: Outstanding: Channel design would accommodate additional future features such as added capacity if needed. Adequate: Channel design conveys runoff for the full buildout condition. Poor: Channel designed to convey runoff from existing development. Unacceptable: Channel design does not convey current design flows.			
Alternative	**Rating**	**# Score**	**Comments**
A	Unacceptable	0	Channel cannot carry design flows.
B	Very good	4	Channels could carry added capacity by floodwall/levee additions.
C	Very good	4	Same as alt B.
D	Very good	4	Same as alt B

Objective 1— Homes, schools, businesses and transportation networks are protected from flooding and erosion (E-2.2.1.1)			
Criterion 5: Local Drainage – Support of local storm drain systems Rating guidance: Outstanding: alternative design improves local drainage in storm sewers Adequate: alternative accommodates drainage input and does not exacerbate local flooding Poor: alternative accommodates local drainage but may increase local flooding somewhat Unacceptable: alternative does not accommodate local drainage systems			
Alternative	**Rating**	**# Score**	**Comments**
A	Adequate	3	Current system.
B	Very good	4	Would accommodate local drainage
C	Very good	4	Same as Alt B
D	Very good	4	Same as Alt B

Objective 1— Homes, schools, businesses and transportation networks are protected from flooding and erosion (E-2.2.1.1)

Criterion 6: Time to Implementation – How quickly could flood protection elements become effective

Rating guidance:

Outstanding: least amount of time to implementation compared to other alternatives

Adequate: average amount of time compared to other alternatives

Poor: longest amount of time compared to other alternatives

Unacceptable: Indefinite time

Alternative	Rating	# Score	Comments
A	Outstanding	5	Existing setup; therefore, no time needed.
B	Unacceptable	0	Construction techniques very straightforward; however, the work required under this alternative for reaches 6-8b would need to be funded.
C	Adequate	3	Creek work is harder (i.e. dewater, replant,..)
D	Adequate	3	Construction for levee and floodwall is easier and more straightforward.

Objective 2—Support Ecologic Functions and Processes (E-2.2.1.2)

Criterion 1: Meets Local Habitat Goals – Ability to meet habitat goals as defined from examining the watershed as a whole and accounting for opportunities and constraints specific to the project area

Rating guidance:

Outstanding: alternative meets or exceeds local habitat goals

Adequate: alternative meets some local habitat goals and is not in conflict with others

Poor: alternative is in conflict with a few local habitat goals

Unacceptable: alternative is in conflict with most local habitat goals

Alternative	Rating	# Score	Comments
A	Poor	1	See breakdown on Habitat Goals Checklist (next page). This alt generally keeps the status quo and protects existing habitat values with no restoration.
B	Adequate	3	Protects existing habitat values with no restoration.
C	Adequate	3	Same as alt B.
D	Adequate	3	Same as alt B.

Objective 2—Support Ecologic Functions and Processes (E-2.2.1.1)

Criterion 2: Quality of habitat – Quality of habitat provided by alternative

Rating guidance:

Outstanding: relatively undisturbed habitat, native plants, high potential to meet needs of fish and wildlife in all phases of lifecycle

Adequate: Adequately support the needs of fish and wildlife in all phases of lifecycle

Poor: Alternative focuses primarily on special needs of threatened or endangered species

Unacceptable: does not provide any habitat value

Alternative	Rating	# Score	Comments
A	Poor	1	No new habitat values provided.
B	Adequate	3	Non-native plants would be removed.
C	Fair	2	Non-native plants removed and creek invert reprofiled.
D	Adequate	3	No new habitat values provided.

Objective 2—Support Ecologic Functions and Processes (E-2.2.1.1.)

Criterion 3: Sustainability of Habitat – Intensity of future human intervention required to maintain the target habitat quality; opportunity for habitat to self-adjust appropriately to future change

Rating guidance:

Outstanding: minimal channel maintenance, banks dynamically stable, vegetation to be self-sustaining

Adequate: periodic selective thinning of vegetation, banks dynamically stable, short-term establishment period needed

Poor: regular maintenance anticipated, channel banks may require stabilization over time, intervention needed to maintain vegetation over long term

Unacceptable: regular vegetation removal, unstable banks, constant irrigation needed

Alternative	Rating	# Score	Comments
A	Poor	1	Existing condition.
B	Fair	2	
C	Poor	1	
D	Fair	2	

Objective 2—Support Ecologic Functions and Processes (E-2.2.1.1.)

Criterion 4: Connectivity of Habitat – Integration of habitat elements into surrounding habitat landscape and within project area

Rating guidance:

Outstanding: continuous riparian corridor appropriately integrated, creek and floodplain connected laterally

Adequate: contiguous wildlife-accessible corridor connected to habitat mosaic, floodplain not fully connected (and not fully unconnected) to riparian zone

Poor: non-contiguous riparian wildlife corridor, floodplain not connected to riparian zone

Unacceptable: not integrated into surrounding habitat

Alternative	Rating	# Score	Comments
A	Fair	2	No new plantings provided. Current condition unchanged.
B	Poor	1	Floodwalls have impact on the connectivity.
C	Poor	1	Same as alt B.
D	Poor	1	Same as alt B.

Objective 3—Integrate Physical Stream Functions and Processes (E-2.2.1.3)

Criterion 1: Floodplain – Inclusion of an appropriately-sized overflow area within the flood conveyance corridor that effectively conveys high flows and dissipates erosive energy (“multi-stage” channel)

Rating guidance:

Outstanding: active channel connected to floodplain at bankfull level, floodplain has adequate width.

Adequate: modified floodplain, active channel, limited r/w may require containment means, or bypass channel used

Poor: flow will not spread out laterally, multi-stage channel, but not at bankfull level

Unacceptable: single-phase channel

Alternative	Rating	# Score	Comments
A	Unacceptable	0	Overflow is not connected through entire creek reach.
B	Adequate	3	Channel opening modified floodplain.
C	Unacceptable	0	Same as alt A.
D	Adequate	3	Overflow is not connected through entire creek reach.

Objective 3—Integrate Physical Stream Functions and Processes (E-2.2.1.3.)

Criterion 2: Active Channel – Appropriateness of size and configuration of the active channel relative to watershed inputs and reach characteristics

Rating guidance:

Outstanding: appropriate active channel shape, meander length, curve radius, amplitude, belt width, sediment carrying capability, mobile bed, pool riffle sequence, tidal processes. Control structures unnecessary.

Adequate: active channel with stable width and depth, rock or other hardscape used to prevent erosion, small drops, hardened one-side channels to maximize floodplain width

Poor: active channel incorporated, unknown if effective

Unacceptable: no active channel

Alternative	Rating	# Score	Comments
A	Unacceptable	0	Channel doesn't have adequate geomorphic characters.
B	Very good	4	Channel redesigned based on geomorphic principles.
C	Poor	1	Widened and reprofiled channel
D	Very good	4	Channel doesn't have adequate geomorphic characters.

Objective 3—Integrate Physical Stream Functions and Processes (E-2.2.1.3.)

Criterion 3: Stable Side Slopes – Stability of Channel side slopes using geotechnical or biotechnical methods

Rating guidance:

Outstanding: all side slopes stable through use of proper slope ratios, materials, and vegetation

Adequate: side slopes protected through biotech means

Poor: side slopes protected using hardscape

Unacceptable: side slopes unstable and unprotected

Alternative	Rating	# Score	Comments
A	Adequate	3	Existing condition
B	Outstanding	5	2:1 side slope
C	Adequate	3	Same as alt A.
D	Outstanding	5	Existing condition

Objective 3—Integrate Physical Stream Functions and Processes (E-2.2.1.3.)

Criterion 4: Upstream / downstream Transitions – Stability of channel's integration with upstream and downstream reaches

Rating guidance:

Outstanding: invert integrated so that it transitions seamlessly with stable u/s and d/s reaches, no abrupt changes in grade or direction of flow

Adequate: requires small stabilizing grade controls (<18")

Poor: large (>18") hardscaped grade control needed

Unacceptable: unstable transitions between u/s and d/s reaches

Alternative	Rating	# Score	Comments
A	Adequate	3	
B	fair	2	
C	poor	1	
D	poor	1	

Objective 4—Minimize Maintenance Requirements (E-2.2.1.4.)

Criterion 1: Structural Features – Maintenance requirements associated with structural features within project corridor

Rating guidance:

Outstanding: no structural features requiring maintenance

Adequate: need for features requiring maintenance reduced compared to existing

Poor: maintenance required roughly similar to existing

Unacceptable: more structural features than existing

Alternative	Rating	# Score	Comments
A	Adequate	3	
B	Adequate	3	New levees, floodwalls, flood benches, and trails need more maintenance.
C	Poor	1	
D	Adequate	3	New floodwalls need more maintenance.

Objective 4 – Minimize Maintenance Requirements (E-2.2.1.4.)

Criterion 2: Natural Processes – Maintenance requirements associated with vegetation growth, erosion, and sediment processes

Rating guidance:

Outstanding: sediment and vegetation removal and bank repair not expected in 100 yeas

Adequate: sediment and vegetation removal and bank repair expected to be infrequent (about 10 years apart), multi-stage channel used

Poor: sediment and vegetation removal and bank repair expected on about three year cycle, no multi-stage channel

Unacceptable: yearly maintenance expected, single-phase channel

Alternative	Rating	# Score	Comments
A	poor	1	Yearly maintenance required.
B	Very good	4	Current near-yearly sediment maintenance would continue. Excavated channel would relieve some stress from natural channels.
C	fair	2	
D	Adequate	3	

Objective 4—Minimize Maintenance Requirements (E-2.2.1.4.)

Criterion 3: Urban Flows – Maintenance requirements resulting from smaller, high frequency storm events and outfall flows

Rating guidance:

Outstanding: maintenance requirements would be significantly reduced using outfall design, off-stream detention, grade control

Adequate: maintenance requirements would be somewhat reduced

Poor: maintenance requirements would be about the same

Unacceptable: much worse than current conditions

Alternative	Rating	# Score	Comments
A	Poor	1	Current conditions.
B	Poor	1	Maintenance required for new features.
C	Poor	1	Same as alt A.
D	Poor	1	Same as alt A.

Objective 4—Minimize Maintenance Requirements (E-2.2.1.4.)

Criterion 4: Access – Incorporation of adequate access for maintenance crews and equipment

Rating guidance:

Outstanding: multi-function access corridors optimized based on expected project needs

Adequate: complies with District policy 3-410

Poor: access corridors provided but does not comply with 3-410

Unacceptable: inadequate or no access provided

Alternative	Rating	# Score	Comments
A	poor	1	Current access unchanged.
B	Adequate	3	Would allow compliance with 3-410 in most reaches, but not all.
C	Adequate	3	Same as alt B.
D	Adequate	3	Same as alt B.

Objective 5—Integrate within the Context of the Watershed (E-2.2.1.5.)

Criterion 1: Meets Local Watershed Goals – Ability to meet watershed goals as defined in a process that examines the watershed as a whole and accounts for opportunities and constraints specific to the project area

Rating guidance:

Outstanding: the alternative substantially advances watershed goals

Adequate: the alternative advances some goals and is not in conflict with any watershed goals

Poor: the alternative is in conflict with a few major watershed goals

Unacceptable: the alternative is in conflict with several watershed goals

Alternative	Rating	# Score	Comments
A	Unacceptable	0	Conflicts with several major watershed goals (see spreadsheet on next pages for watershed goals assessment).
B	Adequate	3	Floodwall has negative impact.
C	poor	1	Levee and channel widening improved conditions.
D	fair	2	Floodwalls at most locations.

Objective 6—Protect the Quality and Availability of Water (E-2.2.1.6.)

Criterion 1: Water Availability – Impact on groundwater recharge

Rating guidance:

Outstanding: alternative would result in a net increase in recharge potential and improve functionality and performance of diversions

Adequate: no net change in recharge potential, diversions not negatively impacted

Poor: would reduce the potential for recharge, diversions not negatively impacted

Unacceptable: substantially reduces opportunity for recharge or degrade performance of diversions

Alternative	Rating	# Score	Comments
A	Adequate	3	Would not change groundwater recharge capability.
B	Adequate	3	Same as alt A.
C	Adequate	3	Same as alt A.
D	Adequate	3	Same as alt A.

Objective 6—Protect the Quality and Availability of Water (E-2.2.1.6.)

Criterion 2: Groundwater Quality – Groundwater quality protection from contamination and the threat of contamination by preventing contaminant entry into groundwater

Rating guidance:

Outstanding: maintain the minimum required separation for natural protection to provide structural features, incorporate BMP, and incorporate outreach

Adequate: doesn’t maintain minimum required separation for natural protection, but provide structure features and incorporate BMP

Poor: doesn’t maintain the minimum required separation for natural protection, however includes BMP

Unacceptable: doesn’t maintain the minimum required separation for natural protection and doesn’t include measures to protect groundwater quality

Alternative	Rating	# Score	Comments
A	Adequate	3	Would maintain current water quality conditions.
B	Adequate	3	Same as alt A.
C	Adequate	3	Same as alt A. The reprofile would have no impact either.
D	Adequate	3	Same as alt A

Objective 6—Protect the Quality and Availability of Water (E-2.2.1.6.)

Criterion 3: Instream Water Quality – Water quality protection through vegetation and instream hydraulic complexity

Rating guidance:

Outstanding: alternative would improve water quality by creating a hydraulically complex channel and including native riparian vegetation in appropriate locations

Adequate: alternative would maintain current water quality conditions

Poor: alternative would reduce streamside vegetation and hydraulic complexity

Unacceptable: alternative would result in significant loss of vegetation, alternative would provide little or no hydraulic complexity

Alternative	Rating	# Score	Comments
A	Adequate	3	Would maintain current water quality conditions.
B	Adequate	3	Same as alt A.
C	Adequate	3	Same as alt A.
D	Adequate	3	Same as alt A.

Objective 6—Protect the Quality and Availability of Water (E-2.2.1.6.)

Criterion 4: Offstream Water Management – Ability to enhance water supply and quality and reduce peak flows through local retention of rainfall and pollution prevention programs

Rating guidance:

Outstanding: alternative contains elements that significantly increase retention and use of rainwater, significantly reduces peak flows, includes educational programs

Adequate: moderately increases retention and use of rainwater, moderately reduces peak flows to the creeks, includes educational programs

Poor: alternative does not contain any such elements

Unacceptable: alternative would discourage local capture of rainfall/runoff

Alternative	Rating	# Score	Comments
A	Poor	1	Would not contain any local water capture or peak reduction elements.
B	Poor	1	Same as alt A. U/S off stream detention has been considered and the cost would exceed the current budget.
C	Poor	1	Same as alt B.
D	Poor	1	Same as alt B.

Objective 6—Protect the Quality and Availability of Water (E-2.2.1.6.)

Criterion 5: Flow Regime – Ability to maintain geomorphically and biologically appropriate range of flows – quantity and timing

Rating guidance:

Outstanding: alternative maintains locally appropriate seasonal variation in flows that will support an appropriate physical channel configuration and habitat

Adequate: alternative includes modification to the locally appropriate flow regime with no significant impact on channel stability or habitat

Poor: alternative includes significant modifications to natural flow regime which is likely to have an impact on channel stability or habitat

Unacceptable: modifications to flow regime are likely to have a significant impact on channel stability or habitat

Alternative	Rating	# Score	Comments
A	Poor	1	
B	Adequate	3	
C	Poor	1	
D	Poor	1	

Objective 7—Cooperate with Other Local Agencies to Achieve Mutually Beneficial Goals (E-2.2.1.7.)

Criterion 1: Mutual Local Goals – ability to achieve project-specific goals and objectives developed jointly by the District and local agencies

Rating guidance:

Outstanding: all goals and objectives developed in a Memorandum of Consensus (MOC) are met

Adequate: some goals and objectives developed in the MOC of all agencies are met

Poor: MOC is developed but only District goals and objectives are met

Unacceptable: few objectives met, or no MOC developed

Alternative	Rating	# Score	Comments
A	Unacceptable	0	No MOC developed.
B	Unacceptable	0	No MOC developed.
C	Unacceptable	0	No MOC developed.
D	Unacceptable	0	No MOC developed.

Objective 7—Cooperate with Other Local Agencies to Achieve Mutually Beneficial Goals (E-2.2.1.7.)

Criterion 2: Supports General Plan – Ability to support goals and policies as stated in general plans of partner agencies

Rating guidance:

Outstanding: supports all pertinent general plan elements

Adequate: supports some general plan elements

Poor: does not support some general plan elements, is in conflict with few

Unacceptable: significant conflicts with major elements in general plans

Alternative	Rating	# Score	Comments
A	poor	1	Current condition doesn’t provide any support
B	fair	2	Support CSJ master trail plan
C	fair	2	Support CSJ master trail plan
D	fair	2	Current condition doesn’t provide any support

Objective 8—Maximize Community Benefits beyond Flood Protection (E-2.2.1.8.)

Criterion 1: Community Safety – Overall safety for appropriate access and recreation

Rating guidance:

Outstanding: all safety issues identified by public safety officials during their review is addressed

Adequate: most safety issues identified addressed, explanation provided for features deemed inappropriate or infeasible

Poor: few if any recommendations incorporated into alternative

Unacceptable: alternative was not reviewed by public safety officials

Alternative	Rating	# Score	Comments
A	Unacceptable	0	See below
B	Adequate	3	See below
C	Adequate	3	See below
D	Adequate	3	See below

Objective 8— Maximize Community Benefits beyond Flood Protection (E-2.2.1.8.)

Criterion 2: Recreation – Quality of recreation experience provided by alternative

Rating guidance:

Outstanding: project would provide unique quality recreational opportunities or a variety of opportunities with good public access and amenities

Adequate: some recreational opportunities incorporated into alternative, access may be limited

Poor: few or no recreational facilities incorporated into alternative

Unacceptable: existing recreational facilities are removed

Alternative	Rating	# Score	Comments
A	Poor	1	No rec facilities foreseen for no project alt.
B	Fair	2	Public access is part of the project
C	Fair	2	Public access is part of the project
D	Fair	2	Public access is limited.

Objective 8— Maximize Community Benefits beyond Flood Protection (E-2.2.1.8.)

Criterion 3: Aesthetics – Quality of aesthetic form provided by alternative

Rating guidance:

Outstanding: this criteria is a qualitative assessment some features to consider include harmonizing with landscape, emulating the natural environment, unexpected large/small features, concrete textured or formed to mimic natural features, park-like setting, art use, amenities such as benches, is clever.

Unacceptable: hardscape significantly greater than greenscape, visual monotony, heavy use of plain concrete

Alternative	Rating	# Score	Comments
A	Fair	2	Current condition has a natural environment
B	Fair	2	Natural creek look and added benches. The floodwalls would impact aesthetics of the creek; however, the wall can be colored or sculpted to look like natural
C	Fair	2	Same as alt B
D	Fair	2	Same as alt B

Objective 8— Maximize Community Benefits beyond Flood Protection (E-2.2.1.8.)

Criterion 4: Social and Cultural Benefits – Opportunity through programs or physical features to promote community involvement

Rating guidance:

Outstanding: includes appropriate infrastructure to support full range of social and cultural benefits

Adequate: includes appropriate infrastructure to support some social and cultural benefits

Poor: does not include appropriate infrastructure

Unacceptable: eliminates existing features or includes inappropriate features

Alternative	Rating	# Score	Comments
A	Poor	1	No new community involvement features.
B	Poor	1	Same as alt A.
C	Poor	1	Same as alt A.
D	Poor	1	Same as alt A.

Objective 8— Maximize Community Benefits beyond Flood Protection (E-2.2.1.8.)			
Criterion 5: Local Economic Effects – Potential effect on property values and/or local business climate Rating guidance: Outstanding: probably increase in value of adjacent properties, commercial benefits to local businesses such as increased foot traffic, alternative increases development possibilities Adequate: no measurable change to property values or local businesses Poor: no change to property values, businesses negatively impacted Unacceptable: decrease in property values and commercial access			
Alternative	**Rating**	**# Score**	**Comments**
A	Adequate	3	No change.
B	Very good	4	Probable increase in home values for parcels protected from flooding and not needing FEMA flood insurance. No commercial benefits other than elimination of flooding impact on roads and utilities.
C	Very good	4	Same as alt 1.
D	Very good	4	Same as alt 1.

Objective 8— Maximize Community Benefits beyond Flood Protection (E-2.2.1.8.)

Criterion 6: Green construction and operation – Reflection of the District's commitment to minimize its impact on the environment

Rating guidance:

Outstanding: a variety of features and methods are incorporated to minimize resource use

Adequate: some features and methods are incorporated to minimize resource use

Poor: missed opportunities for minimal resource use

Unacceptable: significantly increase non-renewable resource use over existing conditions and for the long term

Alternative	Rating	# Score	Comments
A	poor	1	No change.
B	Adequate	3	Native plants would be planted, trails and structures could be made of recycled material from local resources (e.g. gravel from d/s of Berryeassa Bridge.)
C	Adequate	3	Same as alt B.
D	Adequate	3	Same as alt B.

Objective 8— Maximize Community Benefits beyond Flood Protection (E-2.2.1.8.)

Criterion 7: Open Space – Incorporation of open space into alternative design

Rating guidance:

Outstanding: ensures long-term protection of existing open space, creates new open space

Adequate: reserves existing open space in project area

Poor: existing open space would be degraded

Unacceptable: significant loss of existing open space

Alternative	Rating	# Score	Comments
A	Adequate	3	Would not reduce existing open space; but no new open space.
B	Adequate	3	Same as alt A.
C	Adequate	3	Same as alt A.
D	Adequate	3	Same as alt A.

Objective 8— Maximize Community Benefits beyond Flood Protection (E-2.2.1.8.)

Criterion 8: Community Support – Alternative reflects community developed objectives and ideas

Rating guidance:

Outstanding: relative to other alternatives, community indicates overwhelming support

Adequate: community indicates acceptance of this alternative relative to the other alts

Poor: community lacks support for the alternative

Unacceptable: community finds alternative unacceptable

Alternative	Rating	# Score	Comments
A	Poor	1	Continued flood damages not supported by community.
B	Adequate	3	In the public meeting held on September 7, 2011, no residents gave negative comments.
C	Adequate	3	Same as alt B.
D	Adequate	3	Same as alt B.

Objective 9—Minimize Life-Cycle Costs (E-2.2.1.9.)

Criterion 1: Capital cost - Net Present Value of Estimated Cost

Rating guidance: $50 million has been set as a affordable construction cost.

Alternative	Rating	# Score	Comments
A	Outstanding	5	Cost $0 for construction
B	adequate	3	$51 m for construction
C	adequate	3	$22.5 m for construction
D	adequate	3	$27 m for construction.

Objective 9—Minimize Life-Cycle Costs (E-2.2.1.9.)

Criterion 2: Maintenance cost - Net Present Value of all maintenance costs over the life of the project

Rating guidance: see below.

Alternative	Rating	# Score	Comments
A	Outstanding	5	
B	adequate	3	
C	adequate	3	
D	adequate	3	